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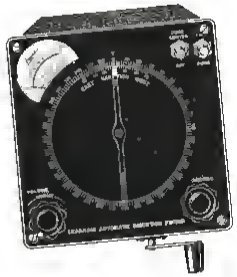
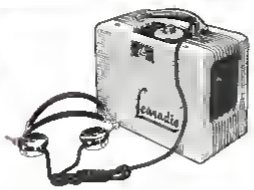
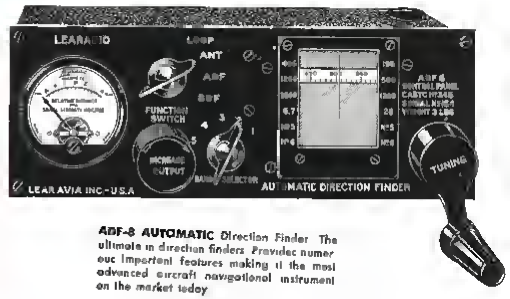


ADF-7 AUTOMATIC Direction Finder. Automatically points and stays pointed to any radio transmitting station within the range from 180 to 2800 KC. Communications reception up to 6700 KC.



TRI-POWR PORTABLE Receiver. Most popular aircraft radio unit in America. Operates from AC, DC or dry cell supply. Radio range and standard broadcast bands.

LOOP HOUSING for Learadio automatic direction finders. Features quadrantal error corrector of loop. High electrical efficiency ensures maximum performance.



ADF-8 AUTOMATIC Direction Finder. The ultimate in direction finders. Provides numerous important features making it the most advanced aircraft navigational instrument on the market today.

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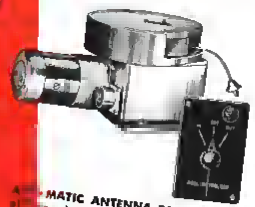
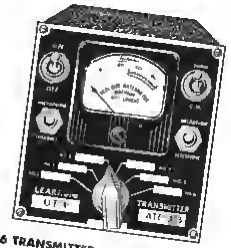


...MATIC ANTENNA REEL. Gives the ... complete remote control command over ... conceivable antenna function by the ... of one simple switch. Automatic ... optional.



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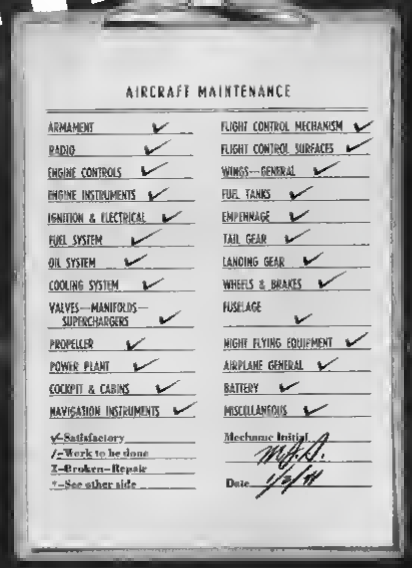

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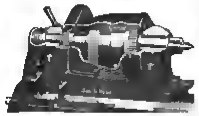
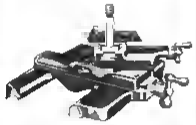
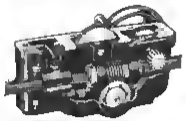


HEADSTOCK. Cutaway view showing integral type bearing and the capillary oiling system.

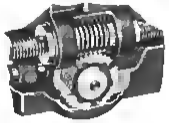
SUPERFINISHED SPINDLE is made of alloy steel with bearing surfaces carburized, hardened, ground and superfinished.



IMPROVED SADDLE and compound rest with adjustable tapered gibs. Cross slide bridge is wide and deep, providing rigid support for the tool rest.

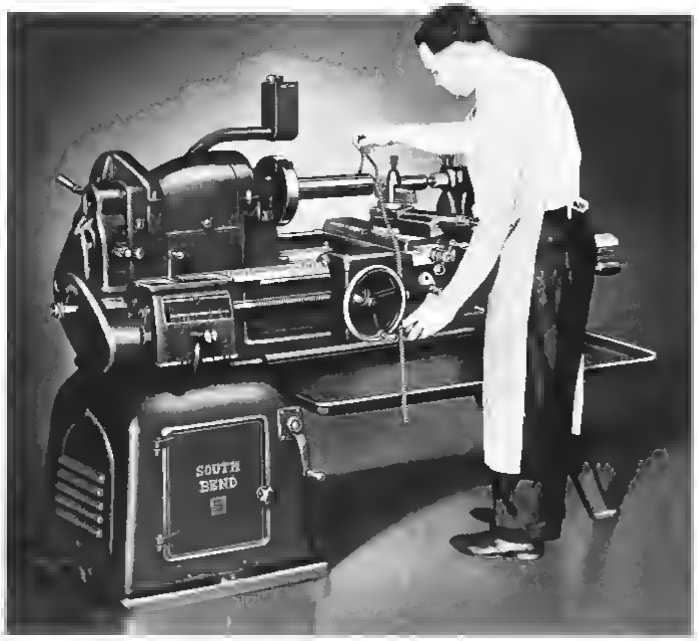


DOUBLE WALL APRON is rigid box type construction with all steel gears running in oil bath.



MULTIPLE DISC CLUTCH. Cutaway view shows alternate keyed steel disc construction.

UNDERNEATH MOTOR DRIVE. Belt drive to spindle is smooth and powerful and provides a wide range of spindle speeds.



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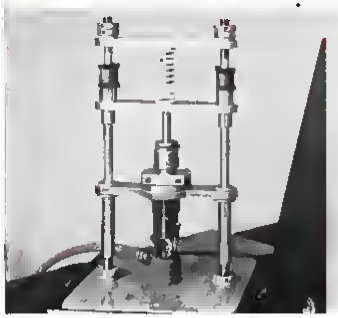
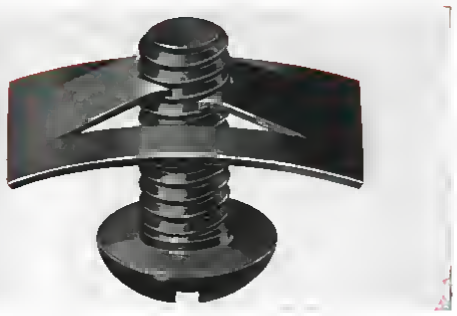


THE SPEED NUT



MATERIALS LABORATORY REPORT

ORJRCT. To determine relative resistance to loosening of nuts or to failure of nuts or other parts due to vibration.

EQUIPMENT: Vibration testing machine shown in photo above. Equipment operating on compressed air (95 to 100 lbs.) vibration 4000 cycles of 3/64" per minute.

PROCRDURR: One SPEED NUT and four approved lock nuts were assembled by hand on the equipment. Two thirty minute tests were conducted at 4000 cycles per minute. In both tests the same SPEED NUT was used untouched.

RRSULTS: After two 30 minute tests, SPEED NUT "A" was still holding tight. In the first test, lock nut "B" loosened after 4 minutes and in the second test loosened after 25 minutes—showing an average duration of tightness in assembly, of 14.5 minutes. Lock Nut "C" loosened after 6 minutes in the first test and after 4 minutes in the second test—showing an average duration of tight assembly of 5 minutes.

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TESTS

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	TIME IN MINUTES	FIRST TEST 10 20 30	SECOND TEST 40 50 60	AVERAGE
"A"	SPEED NUT	STILL HOLDING TIGHT		60 MIN.
"B"	A WIDELY USED LOCK NUT	LOOSENED AFTER 4 MIN.	LOOSENED AFTER 25 MIN.	14.5 MIN.
"C"	A WIDELY USED LOCK NUT	LOOSENED AFTER 6 MIN.	LOOSENED AFTER 4 MIN.	5 MIN.

CONCLUSION. These tests conducted by a prominent aircraft engineering laboratory credited the SPEED NUT with a rating of 100% as against an average rating of 24.16% and 8.33% for the approved lock nuts. Furthermore, the one SPEED NUT outlasted the aggregate life of the other four lock nuts tested.

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- ☐ Aircraft Factory Mechanic (12)

Canadian Airports

FROM NEWFOUNDLAND TO THE YUKON—WILL FIGHT HEAVY SNOWS WITH FWD TRUCKS

FWD Model SU
A true four-wheel drive truck designed and built for the job

70 FWD TRUCKS—A SINGLE ORDER FOR AIRPORT SNOW REMOVAL TRUCKS

OPEN airports all through the winter are vital to the British Empire Air Training Plan in Canada. This network of airports, extending from Newfoundland to the Yukon is subject to extremely heavy snowfalls.

70 FWD trucks of the SU series, equipped with displacement and rotary type snowplows, will soon be in service keeping landing fields and runways clear of snow — the training of fliers will "carry on" all through the severe Canadian winter.

There are many reasons why this — the largest single order ever placed for equipment of this type — came to FWD.

FWD's lead all others—4 to 1—in snow removal service — first choice for faster, lower-cost, most dependable method of combating snow. More different kinds of snowplows are mounted on FWD trucks than any other make of truck or tractor.

Full *four-wheel* power, speed and traction give an FWD the ability to smash through the deepest drifts — to move faster—do a cleaner job at lowest operating costs — in the work of clearing snow.

Write for the FWD performance record on snow removal.

THE FOUR WHEEL DRIVE AUTO CO. CLINTONVILLE WISCONSIN
Canadian Factory: Kitchener, Ontario

FWD TRUCKS

More than 8600 FWD's, equipped with "V" plows, rotary plows, and plows of every description, will combat and conquer the menace of snow blocked roads and keep airports open this winter

Of AMERICAN cotton

By AMERICAN craftsmen

For AMERICAN aircraft

No wonder Flightex is lighter, stronger,
smoother airplane fabric that surpasses
U. S. Army and Navy specifications.

FLIGHTEX FABRIC — WORLD'S PREMIER AIRPLANE FABRIC

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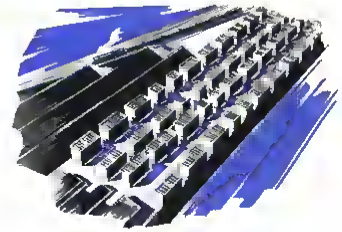
MORE THAN
A Million H.P.
A MONTH

WRIGHT AIRCRAFT ENGINES TOTALING OVER 100,000 H.P. READY FOR SHIPMI

WRIGHT REACHES NEW PEAK OF POWER PRODUCTION . . .

WRIGHT enters February with a rate of aircraft engine production never before equalled in America . . . well over 1,000,000 H.P. per month . . . and increasing rapidly. Yet 1941 will see this figure more than doubled with the addition of the new Cincinnati Division for which an expedited program of tooling and training is now under way.

Wright has pioneered in power. Only because of long years of experience in engineering and building aircraft engines has this vastly increased production been possible, and it has been effected without any compromise whatever in quality. Now a comprehensive training program is enabling thousands of new men to acquire the skill to meet aviation standards. Each day that passes sees the national position more secure with additional tens of thousands of horsepower for defense.



More than 75,000 horsepower is constantly on test day and night in the long batteries of soundproofed cells.

WRIGHT AERONAUTICAL CORPORATION
A Division of Curtiss-Wright Corporation Paterson, New Jersey

WRIGHT *Aircraft* **ENGINES**

DRAWINGS

SPEED ENGINEERING CHANGE NOTICES—
(Project Slips)

Easy! Just make a Ditto master—written, drawn, typewritten, or a combination of all 3. Work is not delayed while changes and new blueprints are made. Used by all large automobile companies.

PUT ACCURACY and ACTION INTO PURCHASING and RECEIVING ORDERS

Ordinarily, purchases arrive in partial shipments. The Ditto forms shown here maintain schedules: (1) Ditto Master for each purchase order, with space for noting deliveries, (2) From this master come Vendor's Copy, Acct. Dept. Copy, Purch. Dept. Copy, Commitment, Acknowledgment, Follow-up Copy; (3) Master is filed in receiving department. As shipments arrive and are noted thereon, the master makes: Material Control Copy, Acct. Dept. Copy, Purchasing Follow-up Copy.

. . . AND DEBIT MEMOS

On rejected parts, debit the vendor's account and add to the next order. Run the following debit memo set from Ditto ribbon or carbon master: Voucher, Accounts Payable, Cost Dept. Copy.

. . . AND SNIPPER'S COPIES

These Ditto masters list serial numbers of major parts. As planes come through, serial numbers are added to the master. The copy then becomes a master on which are added additional serial numbers—a repeated process as more planes are shipped.

. . . AND 1001 OTHER DAILY JOBS

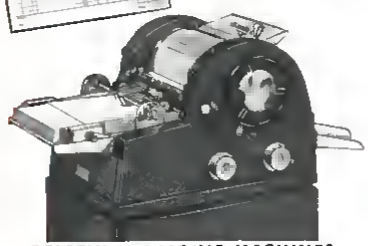
Duplicate all these with Ditto, 100—in 1 to 5 colors at once—on any card or paper stock. Sales Reports, Sales Letters . . Bulletins and Notices . . . Instructions . . . Charts, Graphs . . Telegrams . . , Forms . . . Lists . . . Schedules . . . Company Newspapers, etc., etc.

SIMPLIFY PAYROLL

Never rewrite timekeeping and payroll data. Let Ditto take it off the clock card or time sheet directly—make the whole process practically self operating.

. . . AND TOOL ORDERS

Order is issued for each part to be manufactured, listing operations and tools needed—typed through Ditto reproducing ribbon or carbon. Ditto machine then reproduces copies for Tool Design Dept., Planning Dept., Machine Shop, Machine Shop Tool Crib, Estimating Dept. Tools thus are ready when assembly order is released.



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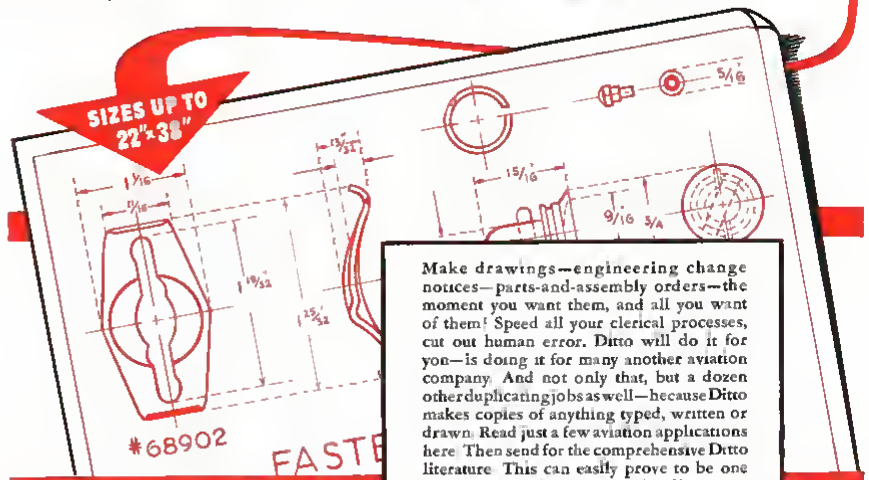

Make drawings—engineering change notices—parts-and-assembly orders—the moment you want them, and all you want of them! Speed all your clerical processes, cut out human error. Ditto will do it for you—is doing it for many another aviation company. And not only that, but a dozen other duplicating jobs as well—because Ditto makes copies of anything typed, written or drawn. Read just a few aviation applications here. Then send for the comprehensive Ditto literature. This can easily prove to be one of your firm's biggest steps ahead!

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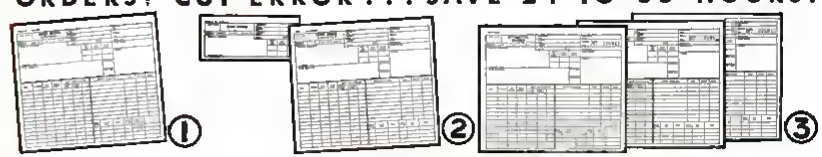

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3. The two combined are run off on Ditto machine, making: Purchasing Order, Labor Card, Material Requisition, Material Receipt, Shop Copy, Production Control Copy, Estimating Record Copy, etc., all identical.

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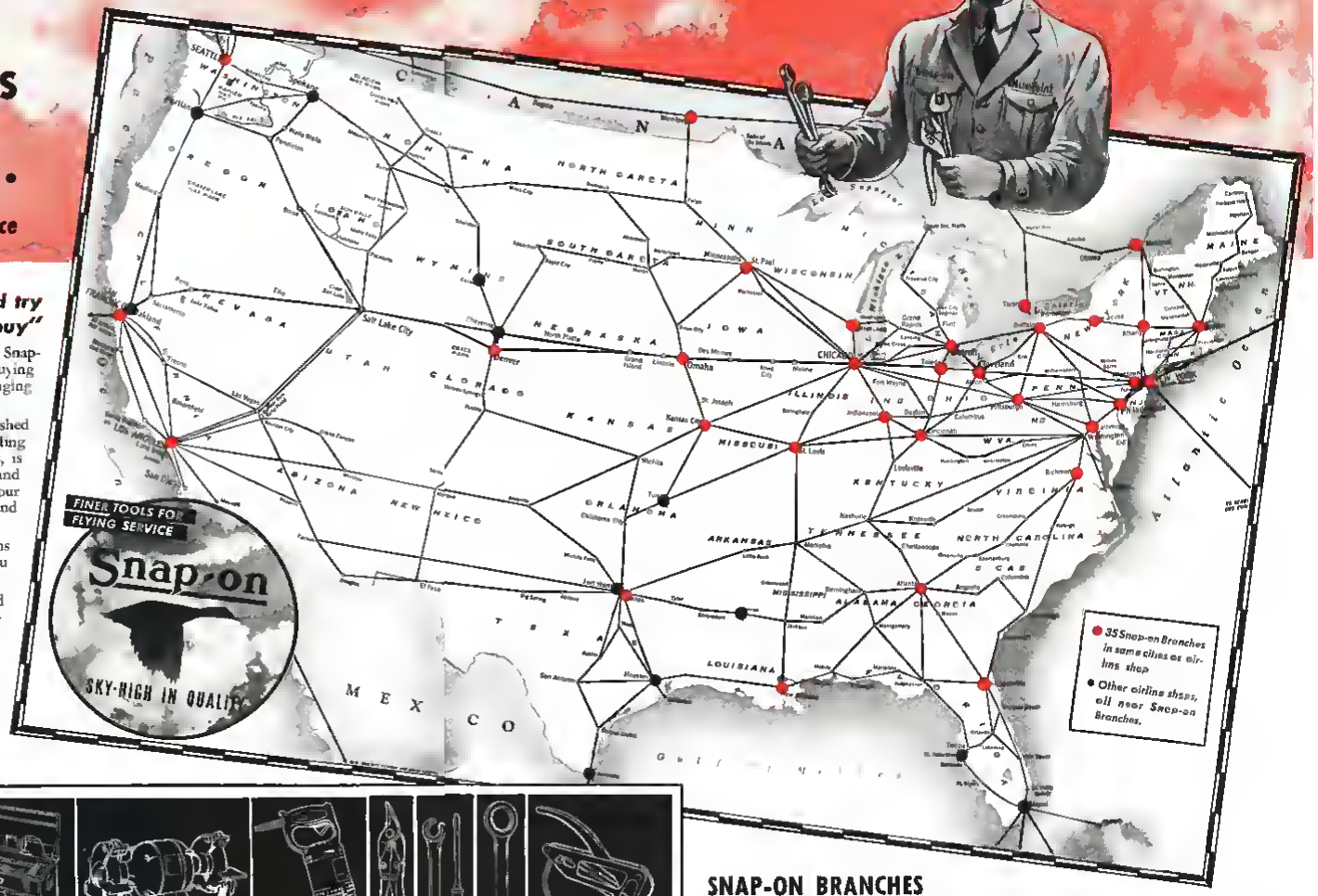

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Snap-on service to manufacturers means increased production, to airlines — improved maintenance, to mechanics — greater skill; to students — a way to start *right*.

Catalog and consultation on any tool matters supplied without obligation See your Snap-on salesman, or write . . .

SNAP-ON TOOLS CORPORATION
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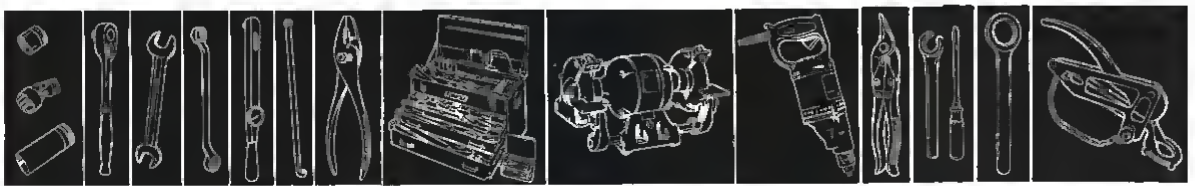

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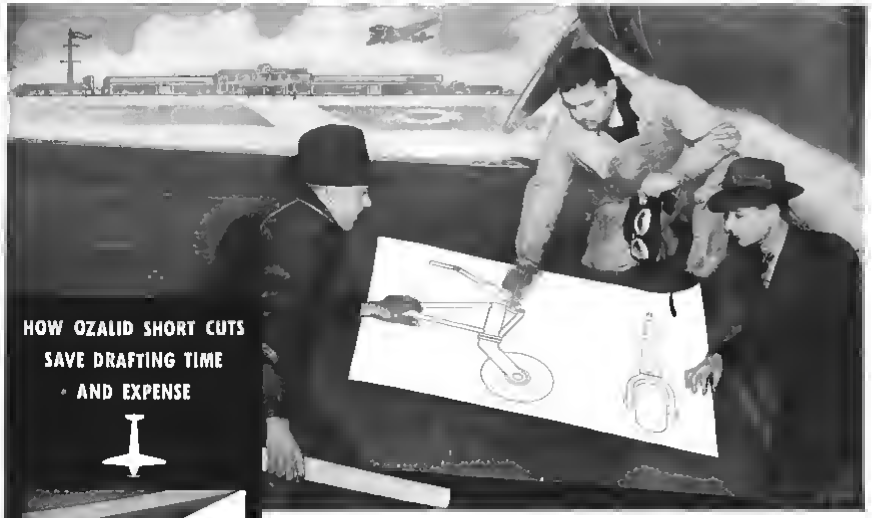
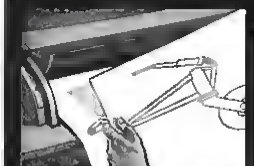
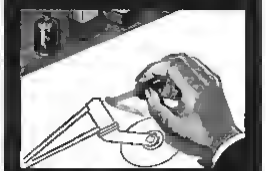


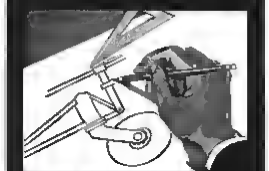
HOW OZALID SHORT CUTS SAVE DRAFTING TIME AND EXPENSE



1. An Ozalid paper, cloth, or foil transparent duplicate is printed and developed dry in the same simple manner as standard Ozalid whiteprints.



2. Any part of the original design can be dropped out on the transparent duplicate by the application of Ozalid Corrector Fluid



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NEW SPEED IN DESIGN CHANGES WITH Ozalid TRANSPARENT DUPLICATES

Industrial production zooms and drafting and design departments become jammed with work. Skilled machinists are scarce; good mechanical draftsmen scarcer. But undermanned and overworked drafting departments get a blood transfusion when they adopt the Ozalid Process.

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Investigate how much "quick drafting" you can really do with an Ozalid machine in your print room. Send today for complete information on How Ozalid Cuts Drafting Time and Expense and also free booklet of dry developed Ozalid whiteprints.

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This *proves* that the instruction provided at ROOSEVELT AVIATION SCHOOL meets all the requirements of the Industry.

SPRING CLASSES START MARCH 31, 1941

AVIATION TRAINING AT ITS BEST

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A. Feb'y 1941

Ryan ST-3

With the proud heritage of tens of thousands of hours in the hardest service to which airplanes can be subjected, the ST-3 is the crowning achievement in a long line of low wing trainers. With a longer and wider fuselage accentuating Ryan sleek lines the ST-3 abounds in engineering and structural refinements. Offered in a wider range of engines (2 radials and 2 in-lines from 125 to 160 h.p.) the ST-3 sets new standards of operating and training efficiency.

RYAN AERONAUTICAL COMPANY, Lindbergh Field, San Diego, California

RYAN TRAINERS ARE IN VOLUME PRODUCTION FOR U. S. ARMY AIR CORPS AND U. S. NAVY

★ ★ ★ IN U. S. ARMY SERVICE

KINNER ENGINES

POWER THE RYAN PT-20A TRAINERS

Kinner Engines are officially serving the U. S. Army and are being installed in the famous Ryan PT-20A Primary Trainers already in military service. High performance... maneuverability and climb characterize these Kinner-powered Ryans. For sixteen years Kinner Engines have demonstrated their efficiency in training, and today they are familiar to students in more than eighty civilian flying schools in America, and to thousands of pilots now in training under the British Commonwealth Air Training Scheme.

KINNER MOTORS, INC. GLENDALE, CALIFORNIA, U. S. A.

KINNER AIRCRAFT ENGINES

Don't bother looking up, Granny— you might drop a stitch!

OVER 900 000,000 passenger miles to their credit That s the record of AMERICAN AIRLINES A record of safety and the utmost efficiency Goodrich salutes American! IT PAYS TO FLY

It's another AMERICAN AIRLINES FLAGSHIP purring by ...on regular schedule

Folks used to stop what they were doing and gaze skyward when they heard the drone of a plane Today they seldom do

Not because aviation has lost any of its romance- But because the industry has so developed that it is a recognized part of the scheme of things.

Long a leader in this development, American Airlines has done much to help the industry attain "more miles with more safety" And it has been our privilege at Goodrich to help American achieve this goal- Standard equipment on the Flagship shown above are Goodrich Silvertown Airplane Tires. These tires help the Flagship Fleet make safer, smoother take-offs and landings Also —all Flagships fly with the added protection of famous Goodrich DE-ICERS.

More than 50 products, developed by Goodrich research, are now serving the industry — on planes both large and small. If you'd like complete information, write airmail to the B F. Goodrich Co., Aeronautical Division, Akron, O.

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FIRST IN RUBBER

BF Goodrich Airplane Silvertowns

THE SAFEST AIRPLANE TIRES EVER BUILT

OVER 50 RUBBER PRODUCTS FOR AIRPLANES INCLUDING TIRES • TAIL WHEELS • ABRASION SHOES • DE-ICERS MATTING RUBBER NOSE GROMMETS • SHOCK ABSORBER CORD

Announcing

change in STANDARD coding for

ADEL-755 CLIPS

DUE TO RECENT CHANGES in military requirements all future production of ADEL CLIPS will be provided with ALUMINUM BONDING MATERIAL, thereby eliminating the necessity for 755-A coding previously required for procuring ALUMINUM BONDED ADEL CLIPS. Hereafter, TINNED COPPER is to be available only on special order

Color differentiation of BROWN NEOPRENE for distinguishing ALUMINUM BONDED CLIPS is likewise eliminated. All future production parts will be supplied with BLACK NEOPRENE MATERIAL because of improved quality as compared to colored compounds

As a means of clarification, CLIPS will continue to be stamped "ALUM BOND," thereby providing differentiation between hundreds of thousands of original design BLACK CUSHIONED TINNED COPPER CLIPS manufactured by Adel for the past several years and the new production BLACK CUSHIONED ALUMINUM BONDED CLIPS The above revisions also apply to Adel-766, 770, 782, 784 and 788 LINE SUPPORT CLIPS

ADEL DUAL PURPOSE LINE SUPPORT BLOCKS will be provided with a BROWN BAND to distinguish between previous production TINNED COPPER assemblies and new ALUMINUM BONDED units

While the above revisions may at first cause some inspection, receiving, and production misunderstandings, the ultimate standardization will result in substantial simplification in stockroom and production line handling.

Universal acceptance of Aluminum Bonding as recommended by Adel Engineers for the past three years will further enhance performance already proven by military and commercial application on ships operating under all types of service in every part of the globe.

SPECIAL REINFORCED METAL CLIP STD ADEL-755 CLIP

ALL ADEL DUAL PURPOSE LINE SUPPORT BLOCKS AND CLIPS ARE MANUFACTURED UNDER UNITED STATES LETTERS PATENTS NOS 2,215,283 and 2,227,528; OTHER UNITED STATES AND FOREIGN PATENTS PENDING.

ADEL

PRECISION PRODUCTS CORP.

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Eastern Sales Engineer J. Henry Reisner, Hagerstown, Md

"THE VALUE OF TIME"

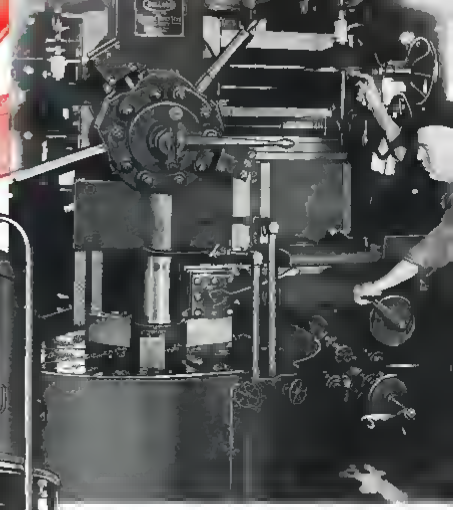
"As we advance in life, we acquire a keener sense of the value of time."

(William Hazlett 1778-1830)

Because men value time so highly, Aviation has already become one of our greatest industries. Its own members know the value of time full well —from every angle.

Every engine, each propeller or instrument—every part whose accuracy is so important to sustained performance, must be duplicated on a grand scale and in minimum time.

Saving Time is Bullard's mission. Bullard Mult-Au-Matics and Bullard Vertical Turret Lathes are fast, economical, and easy to operate—more, they are constructed with the same kind of care, knowledge, and skill which the aviation industry demands of its own designers and builders. That's why Bullard machine tools are selected for machining parts that must be accurate and turned out in great numbers. That's why they are today in practically every shop devoted to aviation parts manufacture. Let Bullard Engineers analyze your machining operations.



Vertical and side heads work simultaneously o this Vertical Turret Lathe, to save time and in crease accuracy in turning out these aeroplan engine sleeves.

This 16" Type "D" Mult-Au-Matic has cu the time for producing propeller hub spide from 5¼ hours per part to 25 minutes an 30 seconds per part.

BULLARD

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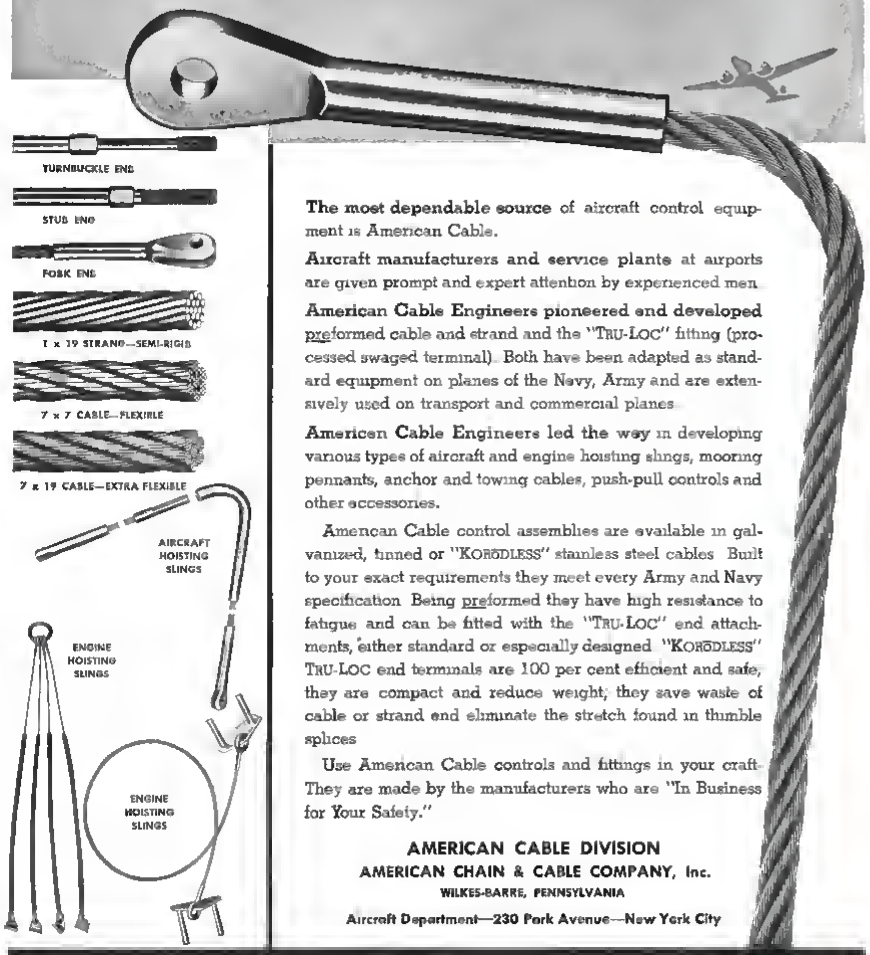
BRIDGEPORT CONNECTICUT

American Cable "KORŌDLESS"

AIRCRAFT CONTROL EQUIPMENT



The most dependable source of aircraft control equipment is American Cable.

Aircraft manufacturers and service plants at airports are given prompt and expert attention by experienced men.

American Cable Engineers pioneered and developed preformed cable and strand and the "TRU-LOC" fitting (processed swaged terminal). Both have been adapted as standard equipment on planes of the Navy, Army and are extensively used on transport and commercial planes.

American Cable Engineers led the way in developing various types of aircraft and engine hoisting slings, mooring pennants, anchor and towing cables, push-pull controls and other accessories.

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Use American Cable controls and fittings in your craft. They are made by the manufacturers who are "In Business for Your Safety."

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE COMPANY, Inc.
WILKES-BARRE, PENNSYLVANIA
Aircraft Department—230 Park Avenue—New York City

AMERICAN CABLE "Korōdless" AIRCRAFT CONTROLS

MENASCO announces

the New D4 and D4-B

IN-LINE, INVERTED ENGINES OF 100 AND 160 H. P.

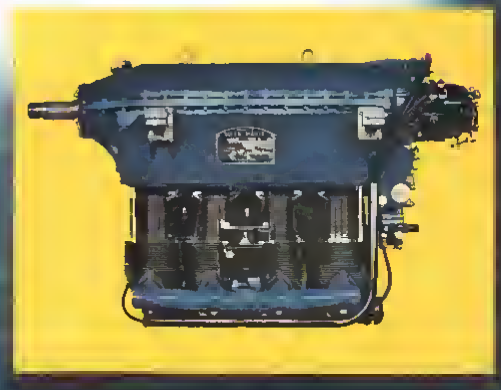
There is a new Menasco organization, a new Menasco Spirit, a new group of experienced engineers, and a new Menasco plant as modern as any in American industry.

Now, as a result, Menasco introduces two new four cylinder engines of 125 and 160 horsepower. These new engines offer all the features and advantages of the Menasco-pioneered in line, inverted basic design.

But in addition, they offer improvements and advancements usually found only in engines of much higher horsepower and price.

Their design, performance and low maintenance cost make them ideally suited for school or military training and private use.

MENASCO MANUFACTURING COMPANY, BURBANK, CALIF.



THE Lockheed LOG

LEADERSHIP in stamina

STAMINA is a Lockheed by-word! It is a "built-in" ruggedness that enables transports to endure the punishments of tougher airline routes. It is an inherent characteristic that allows peacetime airplanes to be transformed into bombers...bombers that can take the unmerciful pounding of aerial warfare...yet return home safely. It is one of the reasons Royal Air Force pilots call Lockheeds the "Wizards of Britain's Defense."

This quality of invincibility in Lockheed isn't something that happens in just one out of ten cases! It is in every Lockheed...commercial or military. From first drawings to final flight tests the abilities of twenty thousand Lockheed employees have been concentrated on one aim...to make every Lockheed the best Lockheed.

If you could cut through the sturdy wing of a Lockheed, you'd understand how it can withstand even the brutal pounding of a direct hit. From wing tip to wing tip stretches a single spar that's built like a bridge for greatest strength—This is another construction feature characteristic of traditional Lockheed DEPENDABILITY...typical of the entire design and construction of the airplane

A hole in the wing big enough to crawl through and other severe damage was not enough to keep this Lockheed "Hudson" Reconnaissance Bomber from returning safely to its base. High performance, exceptional maneuverability and dependable construction provide that STAMINA so necessary to get out of tight spots.

Printed in U.S.A.

LOOK TO *Lockheed* FOR LEADERSHIP

CYCLONE!

In these days of plush-lined cabins always remember there's a cyclone right outside! And it doesn't take a pursuit ship in a 9g dive to get it, either, after all the wind's blowing 200 m.p.h. past your cruising airliner.

Don't forget that wind is striking like hammer blows at every spot you leave open for it. Ready to grasp at the slightest loosness in an elevator hinge, in a fraction of play in an aileron link, or a few degrees of wobble in a control pulley—and hammer a slight rattle into a sickening flutter.

That's why the easiest, most sensitive control system that flies will stay that way just as long as friction and wear are kept out of bearing points.

So when you make your ship easily controllable with ball bearings, you might as well make it *stay that way* with quality aircraft ball bearings. With extra values like Fafnir's races of SAE 52100 steel, through hardened. With Fafnir's dependable one-piece race design and grinding to precise limits of contour radius, pitch diameter, radial and lateral eccentricity.

Special plating, ammoniac greasing equipment that measures pre-lubrication to the fraction of a gram, inspections at every step of manufacture . . . these are all extra values that cost only a few pennies per bearing. But they represent a big step forward in controllability, safety and low maintenance.

The cost of the finest aircraft ball bearings is so insignificant a part of the ship's total cost that you can letter 'Fafnir' at the right spots right on your sketches without unbalancing the budget. The Fafnir Bearing Co., Aircraft Division, New Britain, Conn.

FAFNIR
Ball Bearings

FOR AIRCRAFT ENGINES AND CONTROLS

PROGRESS

As shown by the photographs, very substantial progress has been made in the construction of the additions to the Beech Aircraft Corporation plant. In spite of considerable unfavorable weather, the new buildings are being erected on schedule and should be ready for production operations as originally planned.

The entire personnel of the Beech Aircraft Corporation looks forward to a substantial participation in the National Defense Program in the near future, when quantity deliveries will commence.

BEECH AIRCRAFT CORPORATION—6411 CENTRAL AVENUE—WICHITA, KANSAS, U.S.A.

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Pioneer
Sensitive Altimeters
come from sensitive hands... and minds that think with precision

★ A man has to *think* Precision in order to produce it—even with the aid of so fine an equipment of precision tools and apparatus as Pioneer provides in its modern air conditioned plant By way of example, consider the universal confidence in the extreme accuracy of the Pioneer Sensitive Altimeter Well earned as it is, that trust is not only of an instrument, but of Pioneer men, methods and manufacture This faith Pioneer intends to *continue* to deserve

PIONEER INSTRUMENT
DIVISION OF BENDIX AVIATION CORPORATION
BENDIX, NEW JERSEY, U S A

EIGHTH ANNUAL DIRECTORY NUMBER

AVIATION

Established 1918

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Aircraft in the making

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CONTENTS REGULAR EDITION FEBRUARY 1941

AVIATION'S 1941 Directory

AIRCRAFT

ENGINES

ACCESSORIES

By Raymond Headley

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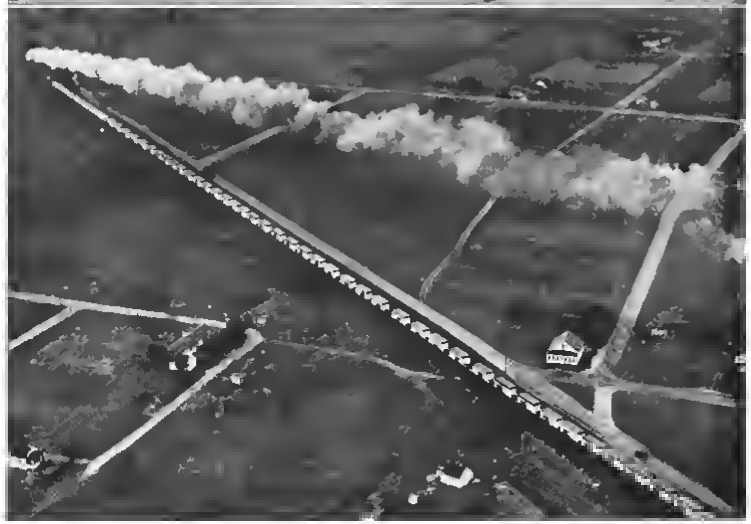
U. S. Army Air Corps Photo



REPUBLIC AVIATION

FIGHTERS ROLL OUT... 86 railroad cars haul a single shipment of Republic Aviation pursuit-interceptor airplanes consigned to the U. S. Army Air Corps. Meanwhile, twenty-four hours a day, engineers and workmen speed construction on Republic Aviation Corporation's new plant building providing 500,000 sq. ft. of additional manufacturing space, for which a giant tooling program already is well advanced. Republic Aviation is ready for today's job—as it makes ready for tomorrow's.

REPUBLIC AVIATION CORPORATION
FARMINGDALE, LONG ISLAND, NEW YORK, U. S. A.

FLASHES

picked up along the editorial airways

Private Flying Has Its Greatest Year

» THERE is wholesome satisfaction in being able to present an issue of AVIATION dedicated to private flying while defensive preparation is seen on every side. It is our fervent hope that private flying's greatest year will not constitute a peak but will be just a stepping stone toward many greater years, and that the light plane industry will continue to expand along with military manufacturing. But the light plane makers and the manufacturers of engines and accessories for private flying must face emergency conditions squarely. It is unpleasant but not unlikely that they will be faced with priorities and with diversion of basic materials and even some of their skilled labor to the defense industries. Such drastic steps should under no circumstances be taken without absolute conviction of their necessity by those empowered to take them. But the light plane industry must not sit back and wait for these things to happen. Now is the time for you to double your design and development strength and go back to the laboratory for the answers. Somewhere in the vast resources of this nation are materials less urgently needed for defense. Somewhere in the great accumulation of aeronautical research data is the answer to increased efficiency without the eternal addition of more and more engine power. And somewhere in the manufacturing mind there is a method of building many more units with fewer workers. Never before has the commercial industry been in greater need of straight thinking, engineering, and research. And those who realize it and do something about it right now will be those who are still with us after the war.

That's not all. There are a few things for the fixed base operators to think about too. Most of you fellows in the last couple of years have made more money than you ever did before. Uncle Sam has dumped students into your laps and some of you have gotten to be a little soft on your selling. There may be some changes due in your picture. Already CPTP funds have been cut in half. Probably some of your best non-subsidized prospects have been drafted and selective service has just begun. This isn't as bad as it seems. Maybe the defense program gripes you but it is going to furnish you a prospect list bigger and better than you ever had before. There will be jobs for everyone, the ladies too. And they will have more money to spend on flying. Your job is to get out and find them, and drag them to your airport. You better get busy now if you want to keep your two-car garages full of your own automobiles.

We have digressed a little—quite a little from what we started to say. This is the largest, the most attractive and most complete Annual Directory we have ever offered. We are afraid to look at the production cost figures. It has more pictures and three-view drawings of

During a Bombing Raid—You would never suspect that an air raid was going on while this photograph of J. H. Miller, Managing Director of Aviation Corporation Ltd., was being taken. Mr. Miller's letter is printed on the following page.

Light Airplane Exhibition
in Spotlight

THE EASTERN LIGHT AIRPLANE EXHIBITION will be an important part of this year's National Sportsmen's Show, at the Grand Central Palace, New York, February 15 to 23.

Besides popular light planes, there will be displays sponsored by the Airplane Owners and Pilots Association, the Civil Aeronautics Board, the Navy, etc

The Texas Company has, for many years, played an important part in the aviation industry through cooperation with designers, builders, and operators in the development of more effective lubricants and fuels for aviation engines

Because of the efficiency and economy experienced by airline operators through the use of *Texaco Aviation Gasoline* and *Airplane Oil*,

MORE SCHEDULED AIRLINE MILEAGE WITHIN THE U. S. AND TO OTHER COUNTRIES IS FLOWN WITH TEXACO THAN WITH ANY OTHER BRAND

The outstanding performance that has made Texaco preferred in the aviation field has also made it preferred in the fields listed in the panel

These buyers are enjoying many benefits. You, too, will find important advantages when you use Texaco Aviation Lubricants and Fuels.

A Texaco Aviation Engineer will gladly cooperate in making savings for you. Phone the nearest of more than 2300 Texaco distributing plants in the 48 States, or write:

The Texas Company, *Aviation Division*, 135 E. 42nd St., New York, N.Y.

They Prefer
TEXACO

- ★ **More tourists use Texaco *Fire-Chief* Gasoline than any other brand.**
- ★ **More scheduled airline mileage within the U S and to other countries is flown with Texaco than with any other brand.**
- ★ **More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand**
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- ★ **More Diesel horsepower on streamlined trains in the U.S. is lubricated with Texaco than with all other brands combined.**
- ★ **More railroad rolling equipment in the U.S. is lubricated with Texaco than with any other brand.**

TEXACO DEALERS INVITE YOU TO ENJOY

FRED ALLEN in radio's best new comedy every Wednesday night CBS 10 P.M. E.S.T. 9:00 C.S.T. 8:00 M.S.T. 7:00 P.S.T.

METROPOLITAN OPERA SPECIAL every Saturday night • Intermission News • See local newspaper for time and station

TEXACO Lubricants and Fuels
FOR THE AVIATION INDUSTRY

airplanes and more names of companies and people than anything we have done since 1929 and in that year there were too many airplanes as we all know In addition it has more detailed perspective sketches and cutaway drawings than we can remember in any single issue of an aeronautical publication Complete specifications, performance, and equipment are given with each airplane photograph and three view wherever available and complete data on all airplanes and engines in production and a few that are not are condensed into our compact "easily detachable" Specification Tables for those who wish to make quick comparisons of models The usual engine pictures are replaced where possible by perspective installation drawings which tell a far more complete story There are many other improvements We hope you will tell us how you like it

» MISFORTUNE DOESN'T IMPRESS you greatly until it involves some one you know, and we are beginning to receive reports first hand from friends in England. They bring the war much closer to us First letter was a brief note from our London colleague and front line reporter, C G Gray, who explained the nonappearance of manuscript we planned to publish in January It said simply, "I have just been bombed out of house and home, and consequently my affairs are so disorganized that I cannot find time to do the article which I had promised myself I would do for the January number of AVIATION. I hope to send something really good when the mechanism of my office is in better order"

» MORE REVEALING is another note received by one of our friends from Mrs C G Gray It read—

"Just a line to say hello. We are all well The children and I are in a primitive cottage thankfully Charles comes for the week ends

"Our home was blasted last Friday (November 30) large holes in the roof, windows blown out, top floor full of metal and main water pipes

"Charles was safely here—praise be.

"The kids go to the village school and we are living next to nature We can get eggs and onions here which are almost unheard of in town"

» ANOTHER London letter is from J. H. Millar, Managing Director of Aviation Corporates Limited, dated December 4

"It is quite a while since I had the pleasure of seeing you and much too long since I heard how you are getting on

"As a constant reader of 'AVIATION' I would like to take this opportunity of telling you how much the information you publish is appreciated over here and how valuable it is for us to get factual news on which we can rely.

"Among our other activities, we have been the British agents for Consolidated Aircraft Corporation of San Diego, California, since January 1939 Our work for Consolidated has necessitated close contact with the many important departments of the Air Ministry Naturally, with Consolidated's rapidly growing business, our work for them has increased enormously

"In case you would find it interesting enough to publish in your valuable magazine, I enclose a picture that was taken recently An air raid which was in progress at the time did not bother the photographer at all

"It is quite exciting being here. The other night my apartment folded up all around me while I was asleep in bed I woke up to find the window frames, curtains and shades lying across the bed, the bed itself was full of glass and the room was full of broken bricks, rubble and pieces of concrete Except for a few scratches I was quite unhurt

"We do not regard this as living dangerously, but driving a car in the country in the black-out when there is no moon is definitely dangerous I was following what turned out to be a 6 ton Lorry when it pulled up suddenly in front of me on a narrow road and my car ran straight into the back and was wrecked. Fortunately I was not much hurt but on other occasions people have been seriously injured

"We in this company will be very glad to hear from you and those in your organization who may find the time to write If you will be good enough to publish this picture it will show our many friends in the American aviation industry that we are still alive and may remind them to write and tell us how things are going with them"

IT PAYS TO ***FLY***

"As soon as Maguire masters that monocle, they're going to lend him to Britain!"

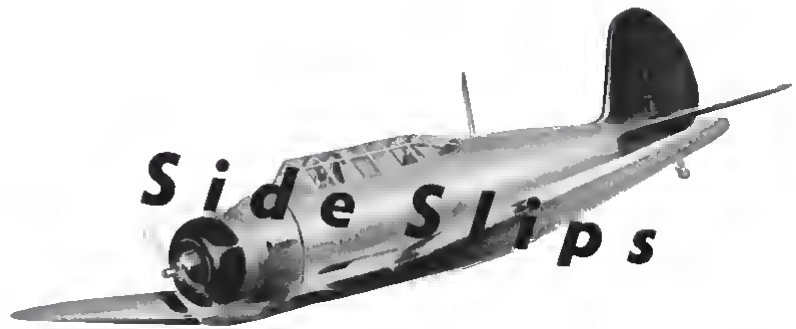
Big bombers need big "legs" and *Bendix builds them!*

Full-capacity loads of fuel and bombs mean a strenuous "workout" for the landing gear when a big bomber takes off. Frequently, the runways are none too smooth . . . and landings under still worse ground conditions are always a fair likelihood. So the extreme care with which Bendix manufacture surrounds the production of Bendix Pneudraulic Shock Struts, Aircraft Wheels and Brakes and Tail Knuckle Assemblies is a vast reassurance. Closest control over metallurgy, design, dimensioning, machining, finishing, assembly and testing is maintained, for the sake of the all-important desire of all concerned—"happy landings!"

BENDIX PRODUCTS DIVISION
OF BENDIX AVIATION CORPORATION
South Bend, Indiana

Bendix
LANDING-GEAR EQUIPMENT

AIRPLANE WHEELS AND BRAKES · PNEUDRAULIC SHOCK STRUTS · SWIVELABLE AND STEERABLE TAIL KNUCKLES · PILOT SEATS



Side Slips

» Have You Heard about the aircraft executives whose plants expanded so much they had to get themselves electric scooters to run around on? Well, they did. We read it in a newspaper,

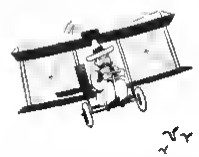
This development pleases us no end. One time when we were just getting into aviation, because it had a wonderful future, a very big executive heard about a little muddle of ours and he told our immediate boss to obtain our resignation. This big executive seemed to us so high and mighty that we didn't dare go and explain things to him. Instead we fumed at night, picturing ourself walking into his office with a large shovelfull of fertilizer, and throwing it all over his desk, with a silky laugh. We didn't do it, of course, and neither did we get fired. But we never got over the ordeal, still feel meek and inferior. Or rather we did till this scooter story came along. Now, we have only to picture this executive of ours trundling down an assembly line on his scooter, and we feel as aggressive as any tom cat.

» The Other Day we were lunching, on another man's money, in a very flossy dining room with soft music and potted palm trees and breast of guinea hen under glass, when in came John Lewis, the poor man's advocate. One of our party looked at Don John and said he was reminded of the new air transport building in New York. He said that, though the building was not open, a few elevator operators were hired to handle the up and down business of general preparations. They all belong to a union. One day the union head man came along and said the building hadn't been formally dedicated yet, and the management would have to hire "hoist engineers" to run the elevators. So, the building hired hoist engineers at some fabulous wages, like $25 a day apiece. First stuff that came along to be hoisted had been manufactured by CIO, and the AFL hoisters refused to hoist it. By the time the difficulty was straightened out, it was 30 min. before quitting time.

» Every day or two of late we hear somebody talking about the gasoline buggy boys mushing in on the flying machine business. Some of the popular magazine magnates are pleased, we hear, they think Detroit will have more money to spend for ads. Nearly everybody else appears to be neutral, including the Washington Administration, which is supposed to be hoping for a speed contest between the aeronauts and the autocrats. All the government wants is lots of airplanes. But some of the financial experts give you the wink and suggest that the aviation pioneers should turn over the industry just as the "emergency" ends, and let it collapse in Detroit's lap. As for us personally, we'd like to see a bit of cross-breeding. Let the two camps get together and turn out a "thrilling, exquisitely styled value sensation for 1945," that will slither out of the garage and down our country lane to the nearest landing strip, where it will spread its wings as we turn a knob, and whisk us away to the town airport, thence to the parking lot. And look here, you boy, we don't want that propeller crinkled, see!

» You Might Be Interested in knowing that Richard du Pont, the serious young man who put over the air mail pick-up system, does not want to take in the whole country. He wants to see other operators get in and start air hook lines. We've about given up making predictions, but we think that puddle-jumper mail lines will net-work all the populous regions of the United States. One good little airplane, equipped with a snatcher, can deliver and collect mail at a score of towns in an hour or two. It looks to us like a set-up for ambitious young men. In fact we know of two or three new projects that are being promoted now.

» Man and Boy, we've been riding in airplanes now for over 20 years. And we still think it is miraculous. While other passengers are sleeping with their mouths open or reading newspapers during a takeoff, we are craning our neck at everything, like a first timer. This behavior always brings the stewardess to tell us what river we are crossing, how to operate the air valve, and what the altitude is. We used always to say 'Listen here, young lady, we flew these things when they were made out of bamboo fishing poles." But



not any more. We found out that bragging about flying airplanes which are now in the Smithsonian museum is not the way to cut a dashing figure before these 1941 dural gals.

Photo from Wide World

The British Aircraft Carrier "Illustrious", which was severely damaged by German dive bombers, January 16.

WARS PROGRESS

Highlights from the Front and Comments on Our Own Defensive Efforts

MOST of the lessons learned so far in this phase of the war seem to be negative. A twenty mile strip of water seems to have upset the Continental technique of the "Blitzkrieg". Skies full of bombers appear to have done little more than to present a better target for determined defenders and to push to prohibitive proportions the loss ratios of attackers. Adequate defense against night bombing remains unsolved but best British brains are hard at work on it. When this is accomplished the next step may be heavy attacks on shipping beyond the easy range of shore based fighters and unhampered by heights necessary to stay out of range of anti-aircraft land batteries.

Then there may come the answer to the riddle of air power vs sea power. The recent sinking of the modern armored Crusier Southampton and the severe damage to the Carrier Illustrious by heavy German dive bombing constitute the greatest proof so far of the effectiveness of aircraft against naval vessels. It is not sufficiently conclusive to recommend that we junk our navies but it is a long way from the record of the first World War when no warships were lost or severely damaged by air attack. This indicates a trend that we must not fail to recognize.

Miracle men are springing up on our side of the Atlantic with solutions to the aircraft production problem. One of the most recent was C.I.O.'s Walter P. Reuther whose plan was to use the idle capacity of the automotive industry in some strange fashion to produce 500 planes a day. Our advice to these well meaning gentlemen is to leave the number of planes per day out of their public utterances. The minute they put them in their arguments become as weighty as a chunk of beryllium. What none of them seems to understand is that nobody in this whole wide world, not even Hitler, *wants* 500 planes a day. No one would know what to do with them if he had them. Airplanes need materials, parts, man-hours of labor, engines, propellers, gasoline, operating bases, organization, pilots, mechanics and morale before they constitute an air force. And even then, if you use too many of them at once to bomb a powerful adversary, you are just making it easier for the enemy to hit a larger proportion of them. The Germans found that out last summer when their losses compared with the British reached alarming proportions. A few figures from a recent speech of President John H. Jonett of the Aeronautical Chamber of Commerce will straighten out your thinking if you are one of those wishful ones who accept this or any other 500-a-day idea. Taxpayers will be interested in the cost,—$25,000,000 a day or $7,500,000,000 a year. Shop employees required,—1,500,000 to 2,000,000 who, with their families, would constitute a community of more than 9,000,000 persons. Machine guns needed, 4,000 a day or nearly one-half of the present annual production every day. And engine and propeller production expansion greater than that of the Biblical loaves and fishes. The age of miracles has passed. The people of the United States should appreciate that the aviation manufacturers have not gone out looking for Aaron's rod but have settled down to do the job the hard way. That is the only way to get it done.

This doesn't mean that there is no place for the automotive industry in the picture. Much of its capacity can and should be used along with that of manufacturers of elevators, automatic stokers, and other devices far removed from aviation. But the place for these producers is in the great army of subcontractors and sub-subcontractors who will be needed to spread the productive efforts. Before the present expansion most of the aircraft factories and one of the two largest engine factories attempted to make as much as possible of the finished product under the home roof. Some of the large plane factories were combinations of landing gear plants, seat plants and many other kinds of plants. Now, with increased quantity orders, many are becoming primarily assembly plants. You cannot walk through any of the large factories without seeing the effects on manufacturing methods of larger quantity orders. One plant actually has a perfectly straight assembly line which it plans to develop into a belt conveyor system.

These production methods were completely impractieable in the days when 100 to 150 ships of the same type constituted a record order and might be spread over a year or two. We must not forget that these dark days are not very far behind us.

The aircraft industry is seizing every possible opportunity to devise and introduce production methods adaptable to the larger numbers of parts it must produce. But that number may never reach the high proportions of the automobile industry and the methods cannot be the same. With the high strength—weight ratios required for everything that must fly plus the exacting specifications and inspections required by the military services, there can be no comparison of quality with automotive parts and assemblies.

Most of the automotive manufacturers have found and are finding that they must start from scratch to serve the aircraft industry. Only a small part of present idle capacity could be used for airplane or engine parts manufacturing. The most successful automotive subcontractors will be those who build new plants or retool old ones.

There is a disposition of press and public to assume that the large scale automotive subcontracting plans now in formulation in Washington are going to start to-morrow. Actually most of them are a year or more away. They are being devised to supplement the present program. It will probably be well toward the fall or later before deliveries of basic materials, shortages in light alloy castings and forgings, and engine, propeller, and critical sub-assembly production problems are satisfactorily straightened out.

A leap in the production curve may be expected this year but it will be heavily weighted by trainers and properly so because we must have pilots as well as planes. The total poundage of planes therefore will not increase as rapidly as the numbers of units produced. In December the production score was 799 airplanes. The estimate published in AVIATION for January (The Truth About the Defense Program by T. P. Wright) was about 750. The difference was due to an unexpected flurry of engines for some airplanes that had been standing on "glider lines". By February we should be up to 1000 per month and we should double this rate by fall.

No matter what we do this will be the critical year for the British. With one-half of our plane production, England should attain equality with Axis production rates by summer but air force parity will not be reached until the spring of 1942. If Germany waits beyond next fall, her chances of victory will diminish very rapidly. It is therefore reasonable to expect major Nazi operations at any moment.

Meanwhile our own defense effort is being strengthened by streamlining the Defense Commission and creation of the Office of Production Manager. Last month we published an article in which the author said that one total defense fundamental was "the determination to sacrifice a normal comfortable way of life and to work increasingly and uncomplainingly to attain the desired end." Since that was written it has been put into practice. T. P. Wright has gone to Washington as Associate Director of Aircraft Production for the newly formed O.P.M. And if you think his job is going to be fun, go down and try it for a day or two. Ted Wright sweltered all last summer to get the air defense procurement program underway, and to straighten out a lot of crooked thinking. While Congress was kicking the program around or ignoring it, he went back to his old job of vice president-engineering for Curtiss-Wright. He has a broad technical background and has had more than twenty years of experience in all phases of aircraft and power plant manufacturing. He has visited, revisited and studied most of the important aircraft plants in Europe. He is thorough, sound, and impartial and is universally respected even by his competitors in business. He will give to this job far more than it ever can give to him. It is extremely fortunate for the aviation industry and for the nation that his sincerity compelled him to accept it.

Continuing his important contribution to the defense program is Dr. A. J. Lombard whose work has already attracted so much favorable attention in Washington and elsewhere. Dr. Lombard has a thorough aeronautical engineering background and has done brilliant work in research, development and design.

The modern armored cruiser "Southampton", sunk in the January 16 dive bombing attack.

A. J. Lombard heads Productioo Planning Section, Division of Aircraft Productioo, of O.P.M.

T. P. Wright who goes to Washington as Associate Director of Aircraft Productioo for O.P.M.

Increases in all phases of civilian flying have brought new markets to private builders

Civil Plane Production Reaches All-time High

MORE civilian airplanes were produced in the United States in 1940 than for the four years of 1932 1933, 1934 and 1935 Approximately 6,870 civil planes were built last year This is an all-time record for any single year in any country

In a world at war, civilian aviation has practically ceased to exist in all European and Asiatic countries The United States is the only country remaining where private flying is an important factor in the nation's aeronautical life This state of affairs is due to the sober fact that we have not become involved in the war While the war has eliminated private flying elsewhere, it has been responsible for the great impetus given flying and the demand for light planes by the Civilian Pilot Training Program

The 6,870 civilian planes built in this country last year were nearly twice as many as the number built in 1939, when 3,715 such planes were produced More than 6,000 of these airplanes were in the light plane group The balance was composed of larger ships for various private and non-scheduled purposes and for airline use

The trend in lightplanes was strongly away from the 50 hp models to those with 65 hp Almost no airplanes were equipped with 40 hp engines The radical change from 1939 to 1940 is shown by the figures from one manufacturer of light engines In 1939 some 78 percent of his engines were of 50 and 55 hp and only 21 percent were of 65 hp Last year 13 5 percent of his engines were 50 and 55 hp and 84 5 percent were of 65 hp This transition to greater horsepower is seen all through the lightplane field

Piper Aircraft Corporation again led the procession A total of 3,013 airplanes were delivered during 1940 This is about 60 percent more than the 1939 figure Of this number, 1 977 were Trainers, 541 were Coupes and 495 were Cruisers Approximately 76 percent of the planes were kept by operators for instruction and the balance went directly to private pilots During the year Piper added some 73,000 square feet of floor space and may very likely add that much more this year

Production figures at Piper for six years, beginning in 1935 are as follows 228, 523, 683 731, 1806 and 3,013 Output last year was 1221 percent over the 1935 production

Undoubtedly the greatest percentage gain in the lightplane field was that of Taylorcraft, who stepped up production some 92 percent over 1939 The plant at Alliance, Ohio turned out 924 airplanes, as compared with 480 in the previous year Of this number 58 percent were Taylorcraft Deluxes and 42 percent were Trainers However, as many of the Deluxe models were used for training it is safe to say that over 500 of these ships became part of the civilian training program for national defense During the year orders for over 1,000 planes were received Eighty percent were for 65 hp models Since June production has been at the rate of about 25 planes per week The new plant just completed will have a capacity of 2,000 planes per year on one shift per day, or some 3,500 from two shifts

The Aeronautical Corporation of America turned out 875 airplanes last year, an increase of 31 percent over the 1939 production Aeronca got off to a slow start when floods in the spring impaired production and then further delays occurred when the factory was moved to Middletown, Ohio During the last five months production was stepped up and reached an average of 135 per month a rate of 1,620 planes per year which gives an indication of what the plant can turn out During the year some 35,000 square feet of floor space was added and at present an additional 27,500 square feet are being added The new space will include an enlarged final assembly department, a new experimental department and a new wood shop

All photographs from Hans Groenhoff

Luscombe increased its airplane output by 74 percent over the 1939 amount Last year 495 airplanes were sold as compared with 285 for the preceding year These all-metal planes are becoming increasingly popular at all airports. The Company found it necessary to add some 19,000 square feet to its West Trenton factory Approximately 70 percent of the Luscombes go directly to private flyers and the balance are kept by operators for instructional purposes Seaplanes compose about four percent of Luscombe's production During 1940 the Silvaire was introduced, which is powered with a 75 hp. fuel injector engine

Out in Kansas City the Porterfield Aircraft Corporation built 235 ships, a great increase over 1939 production All of these airplanes were tandem trainers, most of which were used in the Civilian Pilot Training Program During the year some 22,000 square feet of floor space was added to the factory and nearly that much again will be added this spring

Stinson built 282 civil planes during the year: 260 of the 105 model, and 22 Reliants Production was disturbed when the factory was moved from Wayne, Mich to the large new factory at Nashville Just after production had been nicely begun in the new plant, the company was taken over by Vultee In order to speed up the Stinson military models it was decided to move the building of commercial planes back to Michigan However, with new machinery and more efficient production methods, the company is looking forward to a big year in 1941

Waco built some 266 airplanes during the year, of which number 229 were trainers Fairchild built 142 ships not counting its military production. Of these civil planes, 97 were the popular four place cabin ships and 45 were two-place trainers Ryan production is now almost entirely devoted to military planes The Air Corps and the Navy are also taking the great bulk of the Beechcrafts which are coming out of Wichita The Company is not neglecting its commercial orders however, and last year 26 commercial biplanes were built and 7 twin-engine monoplanes

1940 Civil Plane Production By Engine Horsepower

50 hp and less, 1 engine	336
2 engines	1
51–70 hp 1 engine	4816
71–100 hp, 1 engine	1041
101–165 hp 1 engine	176
166–225 hp 1 engine	297
2 engines	13
226–300 hp 1 engine	36
301–600 hp 1 engine	61
2 engines	14
601–1000 hp 1 engine	1
Multi engines	136
Unclassified	42
Total single engine	6464
Total multi engines	164
Grand total	6670

Rearwin built 90 airplanes and 101 Ken-Royce engines in its Kansas City plant. Cessna Aircraft Company of Wichita reports its plane output was approximately $900,000 Other plants building civil planes also had considerable increases over 1939

Civilian Pilot Training Program

The great expansion in civil aviation last year can be traced directly to the government-sponsored pilot training program During the year over 25,000 young men and women learned to fly under C P T P auspices and by the end of the year an additional 15,000 were nearing the completion of their courses This government program has brought activity to airports throughout the country and has given impetus to all private flying Many civilians have learned to fly on their own initiative because of activity stirred up by C.P.T. students The lightplane boom could never have developed if fixed-base operators had not been able to buy airplanes to teach the thousands of civilian students to fly

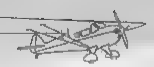
The number of active pilots increased from 31,829 on January 1, 1940 to some 65,000 at the end of the year In 1935 there were only 14,000 certified pilots and the growth was steady through 1939 but then practically doubled in one year There should be an even greater growth this year and the influence on the builders of light airplanes will be far reaching

Production in 1940 by types of airplanes, as reported by the Civil Aeronautics Administration, is as follows 1-2 place single-engine ships 5468, multi-engine 2, 3-5 place single-engine 978, multi-engine 14, 6-20 place multi-engine 28 22 place and over 119 Single-engine seaplanes 17 Single-engine amphibians 1, multi-engine amphibians 1 Unclassified 42 Total single-engine airplanes 6464 Total multi-engine planes 164 Grand total 6670 It is estimated that about 200 more planes were built than this figure

Greatest single factor in private plane boom has been the thousands of new pilots taught through the Civilian Pilot Training Program.

AVIATION'S

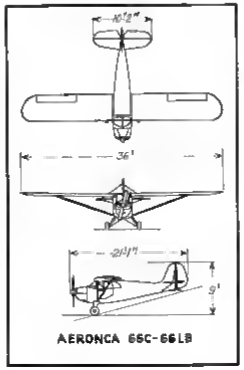
AIR SHOW-IN-PRINT



in a year when aviation facts and information are of vital national importance, Aviation's editors have devoted months of fact-gathering and research to the task of organizing the complete and up-to-date data required by the thousands of men engaged in all branches of aviation activity in this, the 8th Annual Directory Number.

More than 100 current airplanes and engines are illustrated by photographs and three-view drawings, accompanied by detail sketches and the most pertinent specifications. Supplementing these are complete specifications for all planes and engines in production—published in table form for greatest use. A greatly expanded section of Aviation's Sketchbook of Design Detail, with eutaway drawings of latest planes, also is presented.

Several distinct directory sections are included. The first presents the plane and engine manufacturers, their distributors, factory representatives and agents. The second is an alphabetical listing of accessory and material manufacturers and subcontractors. This listing is also presented in another form in which the companies are classified by the types of products that they manufacture. Approved schools and their personnel and certified repair stations also are listed.



AERONCA 65C-65LB

SPECIFICATIONS. Span 36 ft., overall length 21 ft. 3 in., height overall 9 ft., landing gear tread 72 in.; wing loading 7.4 lb. per sq. ft., power loading 19.23 lb. per hp., weight empty 720 lb., gross weight 1250 lb. The Model 65CA is powered by a Continental engine and the Model 65LB is powered by a Lycoming engine, both rated at 65 hp. at sea level. The fuel capacity is 17 gallons, normal range of 350 miles, fuel consumption at cruising speed is 4.3 gallons per hour for the CA and 4 for the LB. Diameter of the propeller is 70 in. for CA and 70 for LB. Area of wing (including allerons) 160 sq. ft., total ailerons 19.8 sq. ft., fin 6.5 sq. ft., rudder 8.2 sq. ft., stabilizer 13.6 sq. ft., total elevators 11.54 sq. ft. Seats two.

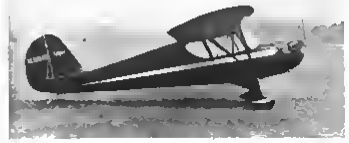
PERFORMANCE. High speed 109 m.p.h. at sea level, cruising speed, 100 m.p.h. at sea level, stalling speed 38 m.p.h., climb at sea level 600 ft. per minute, service ceiling 15,000 ft.

CONSTRUCTION MATERIAL. Wing is made of solid spruce spars, spruce ribs, fabric covering. Fuselage is of steel tubing welded, with fabric covering.

Tail Wheel

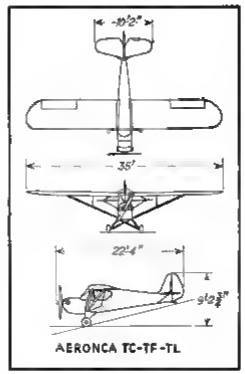
STANDARD EQUIPMENT includes air speed indicator tachometer, oil pressure gage and oil temperature gauge, ignition switch, primer, parking brake, fuel valve, carburetor heater and recessed cabin heater controls for safety.

A. T. C. No. 675 (65CA) No. 702 (65LB)



AERONCA Model 65CA and LB

(For further specifications see table p. 102)



AERONCA TC-TF-TL

SPECIFICATIONS. The span is 35 ft., overall length 22 ft. 4 in., overall height 6 ft. 9 in., landing gear tread 70 in. Wing loading 6.8 lb. per sq. ft., power loading 17.7 lb. per hp. weight empty 700 lb., gross weight 1,150 lb. Model TL is powered by a 65 hp. Lycoming engine. Model TC with a Continental and Model TF with a Franklin with the horsepower being developed at sea level altitude. 12 gallon fuel capacity, normal range of 250 miles, fuel consumption at cruising speed 4 gallons per hour. Propeller measures 70 in. in diameter. Wing area (including ailerons) 160 sq. ft., total ailerons 19.7 sq. ft., fin 6.5 sq. ft., rudder 8.2 sq. ft., stabilizer 13.6 sq. ft., total elevators 11.54 sq. ft. Seats 2.

PERFORMANCE of this model at sea level high speed 100 m.p.h., cruising speed 90 m.p.h., stalling speed 35 m.p.h., climb at sea level 600 ft. per minute, service ceiling 15,000.

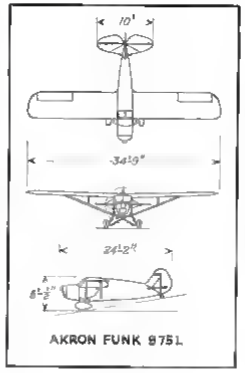
Aileron Control

A. T. C. No. 728

AERONCA Model 65TL

CONSTRUCTION MATERIAL. Spars are of solid spruce, aluminum ribs wing covered with fabric material. The fuselage is of welded steel tubing fabric covered. The landing gear is of fixed type. Shinn wheel, 6.00 x 6, Shinn mechanical brakes. Oleo shock unit and skid and wheel tail unit.

(For further specifications see table p. 103)



AKRON FUNK 875L

SPECIFICATIONS. The span is 35 ft., overall length 20 ft., overall height 6 ft., landing gear tread 72 in., Wing loading 8 lb. per sq. ft., power loading 18 lb. per hp., weight empty 800 lb., gross weight 1,350 lb. It is powered by a Lycoming engine rated at 75 hp. at sea level. Fuel capacity 16 gallons, normal range of 350 miles, fuel consumption at a cruising speed of 4.5 gallons per hour. Propeller diameter is 76 inches. Wing area (including ailerons) is 160 sq. ft., total ailerons 19 sq. ft., fin 4.5 sq. ft., rudder 6.94 sq. ft., stabilizer 15.2 sq. ft., total elevators 10 sq. ft. Seats two.

PERFORMANCE. High speed is 112 m.p.h. at sea level, 103 m.p.h. cruising speed at sea level. Stalling speed 37 m.p.h., 800 ft. per minute climb at sea level, 17,000 ft. service ceiling.

CONSTRUCTION MATERIAL. The wing spars are of laminated spruce, spruce ribs, and covered with fabric. Firestone landing gear wheels. Shinn mechanical brakes. Oleo landing gear shock unit and tail unit.

Engine Mount

A. T. C. No. 715

AKRON FUNK Model 875L

STANDARD EQUIPMENT consists of tachometer, air speed indicator, oil pressure gauge and oil temperature gage, battery and ease navigation lights. Special electric starter radio receiver and transmitter, turning and banking indicator, and landing lights.

(For further specifications see table p. 105)

APPLEGATE Amphibian Model P- No. 1

SPECIFICATIONS: The span is 38 ft. 6 in. overall length 25 ft., overall height 8 ft., landing gear tread 58 in. Wing loading weight is 8.68 lb per sq. ft., power loading 10.8 lb per hp., weight empty 998 lb., gross weight 1500 lb. It is powered with a Franklin 199 engine, rated at 95 hp. at sea level, fuel capacity 33 gallons, normal range of 500 miles, fuel consumption at a cruising speed of 6 gallons per hour. The propeller measures in diameter 72 in. Wing (including ailerons) 183 sq. ft., total ailerons 16.2 sq. ft., fin 4.06 sq. ft., rudder 6.73 sq. ft., stabilizer 14.66, total elevators 10.64 sq. ft.

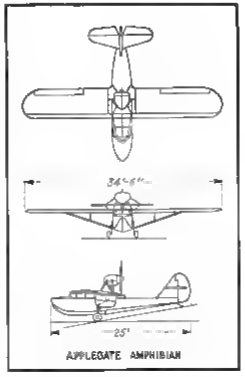
PERFORMANCE: High speed 102 m.p.h. at sea level, cruising speed of 85 m.p.h. at sea level, stalling speed 45 m.p.h., climb at sea level 450 ft.-per minute, service ceiling 11,000 ft. Wing spars are of spruce, N'eral ribs, covered with fabric. Fuselage is aluminum alloy 525. The landing gear, skid tail unit.

STANDARD EQUIPMENT: Consists of Cub tires and brakes, Gardner propeller, Cub seats controls lights, Applegate shock strut, Pneumatic wing tip floats. Seats two.

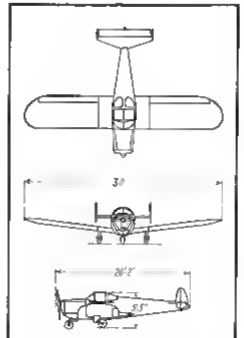
(For further specifications see table p. 105)

Engine Mount

N.A.T.C



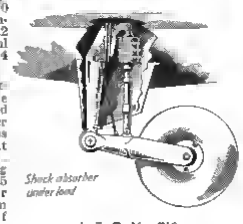
APPLEGATE AMPHIBIAN



ERCOUPE 415-C

SPECIFICATIONS: The span is 30 ft., overall length 20 ft. 2 in., overall height 5 ft. 11 in., landing gear tread 84 in., wing loading 8.2 lb. per sq. ft., power loading 18.1 lb. per hp., weight empty 716 lb., gross weight 1,175 lb. this model is powered by a Continental engine rated at 65 hp. at sea level, fuel capacity 14 gallons, normal range 350 miles, fuel consumption at cruising speed 4 gallons per hour, diameter of propeller 72 in., area of wing (including ailerons) 142.6 sq. ft., total ailerons 16.8 sq. ft. 6x 3.3 sq. ft. rudder 6.9 sq. ft., stabilizer 10.2 sq. ft. total elevators 9.4 sq. ft.

PERFORMANCE: The high speed performance is 117 miles per hour at sea level, cruising speed 105 miles per hour at an altitude of 3,000 ft.



Shock absorber under hood

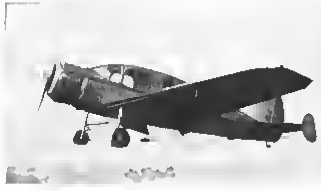
A.T.C. No. 718

ENGINEERING & RESEARCH Model Ercoupe 415-C

stalling speed 40 miles per hour, climb at sea level 800 ft. per minute, service ceiling 14,000 ft. Seats 4.

CONSTRUCTION MATERIAL: The wing spars are of Alcoumium Alloy, I" section; the ribs are of aluminum alloy, the covering material is of aluminum alloy and fabric, fuselage is aluminum alloy monocoque type.

(For further specifications see table p. 105)



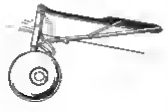
BELLANCA Model No. 14-9 Cruisair

SPECIFICATIONS: The span is 34 ft. 2 in., length overall 21 ft. 3 in., height overall 6 ft. 3 in., landing gear tread 8 ft. 9 in. Wing loading 10.8 lb. per sq. ft., power loading 10.4 lb. per hp., weight empty 1050 lb., gross weight 1750 lb. This model is powered by a Kenn-Royce or LeBlond engine, rated at 90 hp., fuel capacity 20 gallons, normal range of 420 miles, fuel consumption at cruising speed 5 gallons per hour. The propeller diameter is 74 inches. Wing (including ailerons) 162 sq. ft., total ailerons 14 sq. ft., fin 6.5 sq. ft., rudder 5.8 sq. ft., stabilizer 16.07 sq. ft., total elevators 9.36.

PERFORMANCE: High speed 133 m.p.h., cruising speed 120 m.p.h. at an altitude of 5,000 ft. Stalling speed 45 m.p.h., climb at sea level 750 ft. per minute, service ceiling 14,000 ft.

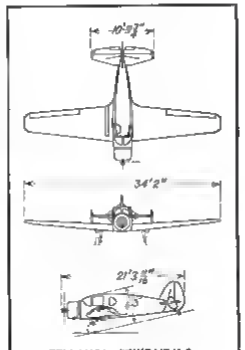
CONSTRUCTION MATERIAL: The wing spars are of spruce plank, ribs of spruce plywood, covered with plywood. Steel tubing with fabric covering is used for the fuselage. The landing gear is of retractable type, wheels measure 8.00 x 4. Goodrich and Palmer hydraulic brakes. Oleo landing gear shock unit, Oleo wheel tail unit. Plexiglas is used for cock pit enclosures, landing-light covers, and other transparent sections. Seats 3.

(For further specifications see table p. 105)

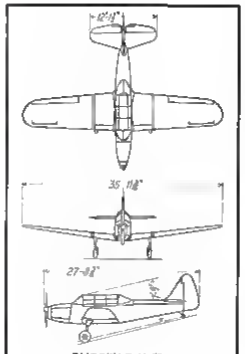


Retractable Gear

A.T.C. No. 716



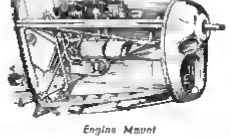
BELLANCA CRUISAIR M-9



FAIRCHILD M-62

SPECIFICATIONS: The span is 36 ft., overall length 27 ft. 8 in., overall height 7 ft. 9 in., landing gear tread 115 in., wing loading 12.25 lb. per sq. ft., power loading 14.0 lb. per hp., weight empty 1,749, gross weight 2,450 lb., the model is powered by a Ranger engine at a total rate of 175 hp. at sea level, fuel capacity 45 gallons, normal range 550 miles, fuel consumption at cruising speed 10 gallons per hour, diameter of propeller 86 in., area of wing (including ailerons) 200 sq. ft., total ailerons 16.8 sq. ft., fin 6.9 sq. ft., rudder 14.5 sq. ft., stabilizer 26.7 sq. ft., total elevators 13.2 sq. ft. Seats 2.

PERFORMANCE: The high speed is 140 m.p.h. at sea level, cruising speed 120 m.p.h. at sea level, stalling speed 50 m.p.h., climb at sea level 835 ft. per minute, service ceiling 16,000 ft.



Engine Mount

A.T.C. No. 724

FAIRCHILD Model M-62

CONSTRUCTION MATERIAL: Solid spruce wing spars, aluminum alloy ribs, plywood covering material. The landing gear is of fixed type, hydraulic brakes, Oleo shock unit, wheel tail unit, the fuselage is of welded steel tubing, fabric covered.

(For further specifications see table p. 105)

CULVER Model LCA

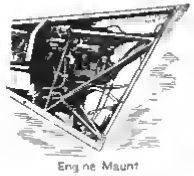
SPECIFICATIONS: Span is 27 ft., overall length is 17 ft. 8 in., overall height is 5 ft. 6 in., the landing gear tread is 79 in., wing loading 10.88 lb. per sq. ft., power loading 17.40 lb. per hp., weight empty 750 lb., gross weight 1,305 lb. It is powered by a Continental engine, total rated hp. is 75 at sea level, fuel capacity is 20 gallons, normal range 600 miles, fuel consumption at cruising speed 4.35 gallons per hour.

PERFORMANCE: High speed 140 miles per hour at sea level, cruising speed 120 miles per hour at sea level, stalling speed 45 miles per hour, climb at sea level 800 ft. per minute, service ceiling 17,500 ft. Seats two.

CONSTRUCTION MATERIAL: The spars are of laminated spruce, wood ribs, fabric covering material, the landing gear is of retractable type. Haves wheel, size 500 x 4. Haves hydraulic brakes, Culver Oleo-spring landing gear shock unit, wheel tail unit, fuselage semi-monocoque.

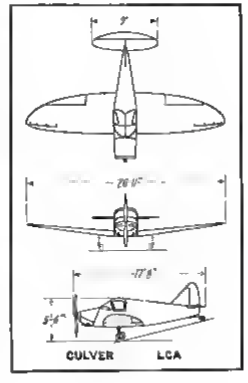
STANDARD EQUIPMENT: Oil pressure gage, oil thermometer, air-speed altimeter, compass, ignition switch, fuel level gage, cabin heat, cabin vent, landing lights, generator, battery, position lights.

(For further specifications see table p. 105)

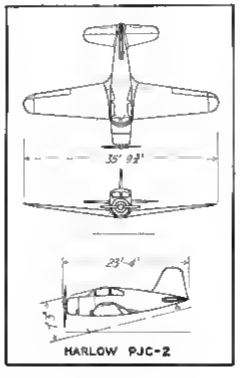


Engine Mount

A.T.C. No. 730



CULVER LCA



HARLOW PJC-2

SPECIFICATIONS: The model PJC-2 is available as 2 or 4 seater specifications for latter follow: span 35 ft. 9¾ in., overall length 23 ft. 4 in., overall height 7 ft. 3 in., wing loading 14.05 lb. per sq. ft., power loading 15.94 lb. per hp., weight empty 1,750 lb., gross weight 2,600 lb. It is powered with a Warner engine rated at 145 hp. at sea level, fuel capacity 34 gal., cruising range 480 mi., cruising fuel consumption 9 gal. per hour, propeller diameter 84 in. Wing area (including ailerons) 185 sq. ft., aileron area (total) 13.02 sq. ft., fin area 12.58 sq. ft., rudder area 10.91 sq. ft., stabilizer area 21.2 sq. ft., total elevator area 17.13 sq. ft.

PERFORMANCE: High speed 140 m.p.h. at sea level, cruising speed 135 m.p.h., stalling speed 52 m.p.h., climb at sea level 650 ft. per min., service ceiling 12,000 ft.

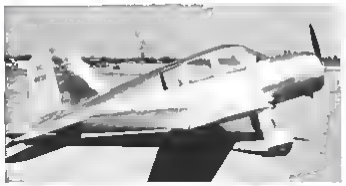
CONSTRUCTION: Aluminum alloy wing spars, metal ribs, aluminum alloy covering material, retractable landing gear, 21 in. wheels, hydraulic brakes, Aircraft Products Oleo shock struts, wheel tail unit, riveted, Alclad fuselage. Seats 2.

STANDARD EQUIPMENT: Pioneer Sperry Jocger, Auto-Lite and Weston instruments, Lord shock mountings, General tires, Air Associates brakes, Curtiss propeller, Harlow seats, Fafnir and Norma Hoffman bearings, Auto-Lite generator and starter. Radio equipment: R.C.A., Lear, Siebenthaler and Aeronaut.

HARLOW Model No. PJC-2

(For further specifications see table p. 105)

A.T.C. No. 689



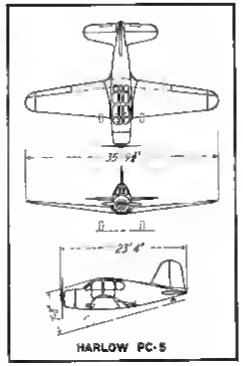
HARLOW Model PC-5

SPECIFICATIONS: Span 35 ft., 9¾ in., overall height 7 ft. 8 in., overall length 23 ft. 4 in., landing gear tread 91 in., wing loading 14.05 lb. per sq. ft., power loading 15.75 lb. per hp., waught empty 1,950 lb., gross weight 2,600 lb., powered by a Warner engine, total rated hp. 165 at sea level, fuel capacity 34 gallons, normal range 480 miles, fuel consumption at cruising speed 10 gallons per hour, diameter of propeller 84 in., wing area (including ailerons) 185 sq. ft., total aileron area 13.62 sq. ft., fin area 12.58 sq. ft., rudder area 10.9 sq. ft., stabilizer area 21.2 sq. ft., total elevator area 17.12 sq. ft. Seats two. PERFORMANCE: High speed 154 m.p.h. at sea level, cruising speed 140 m.p.h. at sea level, stalling speed 52 m.p.h., climb at sea level 740 ft. per minute, service ceiling 13,500 ft. CONSTRUCTION MATERIAL: Aluminum alloy wing spars, metal ribs, aluminum alloy covering material, retractable type of landing gear, 21 in. streamlined General wheels, hydraulic brakes, Aircraft Products Ltd. landing gear shock unit, wheel tail unit, Alclad riveted fuselage. STANDARD EQUIPMENT: Airspeed, sensitive altimeter, tachometer, engine gage unit, fuel gage, compass, clock, rate of climb.

Landing Gear

(For further specifications see table p. 105)

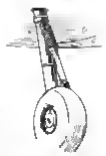
No. A. T. C.



HARLOW PC-5

HOWARD Model DGA-12S

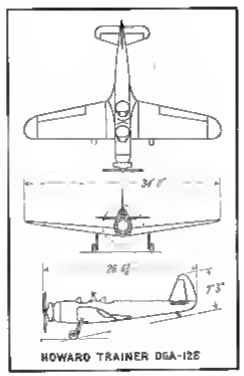
SPECIFICATIONS: Span 34 ft., overall length 25 ft. 0¾ in., overall height 7 ft. 3 in., wing loading 11.14 lb. per sq. ft., power loading 16 lb. per hp., weight empty 1,850 gross weight 2,900 lb., landing gear tread 113½ in., powered by a Warner engine, total rated hp. 125, fuel capacity 31 gallons, normal range 365 miles, fuel consumption at cruising speed 8.3 gallons per hour, diameter of propeller 87½ in., wing area (including aileron) 179.5 sq. ft., total aileron area 20.2 sq. ft., fin area 9.2 sq. ft., rudder area 6.7 sq. ft., stabilizer area 10.7 sq. ft., total elevator area 11.9 sq. ft. Seats two. PERFORMANCE: High speed 118 m.p.h., at sea level, cruising speed 108 m.p.h., at sea level, stalling speed 50 m.p.h., climb at sea level 890 ft. per minute, service ceiling 13,500 ft. CONSTRUCTION MATERIAL: Box spruce wing spars, plywood covering material, ribs mahogany and spruce truss and mahogany webbing, fixed type landing gear, General wheel, size 8.00 x 5, General hydraulic brakes, wheel tail unit, fuselage constructed of welded steel fabric covering.



Landing Gear

(For further specifications see table p. 105)

No. A. T. C.

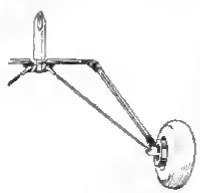


HOWARD TRAINER DGA-12S

INTERSTATE AIRCRAFT AND ENGINEERING

Model S-1A

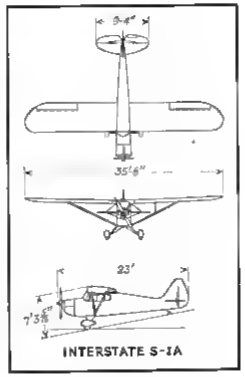
SPECIFICATIONS: The span is 35 ft. 6 in. overall length 23 ft. 2 in., overall height 7 ft. 5 in., wing loading 6.9 lb. per sq. ft., power loading 18.5 lb. per hp., weight empty 700 gross weight 1,200 lb. this model is powered by a Continental or Franklin engine with the total rated hp. 65, fuel capacity 15 gallons, normal range 375 miles, diameter of propellor 76 in. Wing area (including ailerons) 173.8 sq. ft., fin 4.7 sq. ft., rudder 7.0 sq. ft., stabilizer 15.0 sq. ft., total elevators 9.8 sq. ft. Seats two. PERFORMANCE: The high speed is 107 m.p.h., cruising speed 97 m.p.h. stalling speed 36 m.p.h., climb at sea level 700 ft. per minute, service ceiling 14,500 ft. CONSTRUCTION MATERIAL: Spruce spars, metal ribs, fabric covering material, the landing gear is of fixed type, Shinn wheel 6.00 x 6, Shinn hydraulic brakes, Interstate oleo landing gear shock unit, tail 6.00 x 2 steerable. STANDARD EQUIPMENT: It is equipped with the following altimeter, airspeed tachometer, oil pressure, oil temperature fuel gage compass.



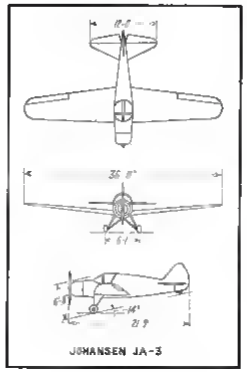
Landing Gear

(For further specifications see table p. 105)

No. A. T. C.



INTERSTATE S-1A



JOHANSEN JA-3

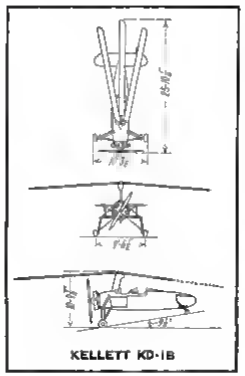
SPECIFICATIONS: The span is 36 ft., overall length 21 ft. 6 in., overall height 6 ft. 8 in., the landing gear tread 73 in., wing loading 6.6 lb. per sq. ft., power loading 18.8 lb. per hp., empty weight 700, gross weight 1,225 lb., this model is powered by a Lycoming engine, total rated hp. 65 at sea level, fuel capacity 15 gallons, normal range 350 miles, fuel consumption at cruising speed 4.0 gallons per hour, diameter of propeller 72 in. The area of wing (including ailerons) is 185 sq. ft., total ailerons 16 sq. ft., fin 6 sq. ft., rudder 6.8 sq. ft., stabilizer 20 sq. ft., total elevators 12.8 sq. ft. Seats two. PERFORMANCE: The high speed is 108 m.p.h., at sea level, cruising speed 96 m.p.h., at sea level, stalling speed 39 m.p.h., climb at sea level 680 ft. per minute, service ceiling 15,000 ft. CONSTRUCTION MATERIAL: Laminated spruce spars, spruce ribs, fabric covering material, the landing gear is of fixed type, air wheels 16 x 7-3 mechanical brakes, shock cord landing gear shock unit, wheel tail unit, fuselage glued spruce plywood. STANDARD EQUIPMENT: It is equipped with the following: air speed tachometer, oil pressure gas gage, altimeter oil temperature.

Engine Mount

No. A. T. C.

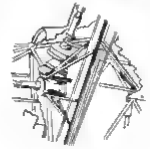
JOHANSEN Model JA-3

(For further specifications see table p. 105)



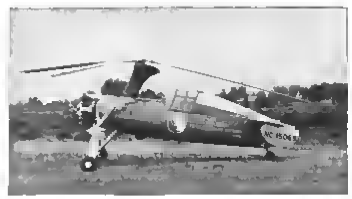
KELLETT KD-1B

SPECIFICATIONS: Span 40 ft., overall length 28 ft. 10 in., overall height 10 ft. 3 in., landing gear tread 114.5 in., wing loading 40.8 lb. per sq. ft., power loading 10 lb. per hp., weight empty 1,030 gross weight 2,250 lb., powered by a Jacobs engine total rated hp. 225 at sea level, fuel capacity 30 gallons, normal range 208 miles, fuel consumption at cruising speed 14.0 gallons per hour, diameter of propeller 102 in., area of wing (including ailerons) 55.2 sq. ft., fin 12.0 sq. ft., rudder 6.2 sq. ft., stabilizer 22.0 sq. ft. Seats one. CONSTRUCTION MATERIAL: Spars are of steel tubing, plywood ribs, fabric covering material. The landing gear is of fixed type, Goodrich wheel 7.00 x 5, Hayes mechanical brakes, Bendix Oleo landing gear shock unit, tail wheel unit, fuselage welded steel tubing, fabric covered.



Rotor Transmission

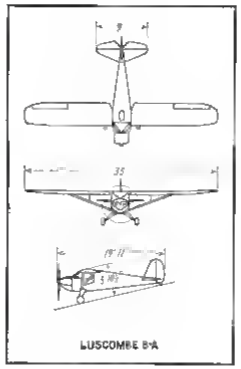
A. T. C. No. 712



KELLETT AUTOGIRO Model KD-1B

PERFORMANCE: High speed 127 m.p.h., cruising speed 102 m.p.h., climb 1,060 ft. per min., service ceiling 14,000 ft. no stalling speed. STANDARD EQUIPMENT: Contains the following: compass, air speed, altimeter, rotor tachometer, engine tachometer, engine gage unit, thermocouple, ammeter, clock.

(For further specifications see table p. 105)



LUSCOMBE 8-A

SPECIFICATIONS: Span 35 ft., length overall 20 ft. height overall 5 ft. 10½ in., landing gear tread 76 in., wing loading 8.6 lb. per sq. ft., power loading 18.5 lb. per hp., weight empty 650, gross weight 1,200 lb. This model is powered by a Continental engine, total rated hp. 65 at sea level fuel capacity 15 gallons, normal range 350 miles fuel consumption at cruising speed 4.25 gallons per hour, diameter of propeller is 76 in., area of wing (including ailerons) 140.0 sq. ft., total ailerons 13.0 sq. ft., fin 4.9 sq. ft., rudder 5.65 sq. ft., stabilizer 13.0 sq. ft., total elevators 8.75 sq. ft. Seats two. PERFORMANCE: High speed 115 m.p.h., at sea level cruising speed 104 m.p.h. at sea level, stalling speed 37 m.p.h. Climb at sea level 900 ft. per minute, service ceiling 15,000 ft. CONSTRUCTION MATERIAL: Spars of aluminum alloy, "I" section, ribs of aluminum alloy, fabric covering material, the landing gear is of fixed type, Firestone 16-6 tires, Shinn mechanical brakes, Alclad monocoque fuselage. STANDARD EQUIPMENT: Contains the following: airspeed tachometer, altimeter, oil temperature gage, compass, (extra)

Landing Gear

A. T. C. No. 694

LUSCOMBE Model 8-A

(For further specifications see table p. 105)

LUSCOMBE Model 8 A Seaplane

SPECIFICATIONS: Span 35 ft., overall length 21 ft. 4 in., overall height 8 ft., wing loading 9.0 lb. per sq. ft., power loading 10.4 lb. per hp., weight empty 701, gross weight 1,260 lb.; this model is powered by a Continental engine, total rated hp. 65 at sea level, fuel capacity 15 gallons, normal range 350 miles, diameter of propeller 76 in., area of wing (including aileron) 140.0 sq. ft., total ailerons area 13.0 sq. ft., fin 4.9 sq. ft., rudder area 5.65 sq. ft., stabilizer area 13.0 sq. ft., total elevators area 8.75 sq. ft., total ailerons area 13.5 sq. ft., fin area 4.1 sq. ft., rudder area 5.8 sq. ft., stabilizer area 10.6 sq. ft., total elevators area 9.2 sq. ft. Seats 2.

PERFORMANCE: High speed 102 m.p.h. at sea level, cruising speed 95 m.p.h. at sea level, stalling speed 40 m.p.h., climb at sea level 650 ft. per minute, service ceiling 10,000 ft. Seats 2.

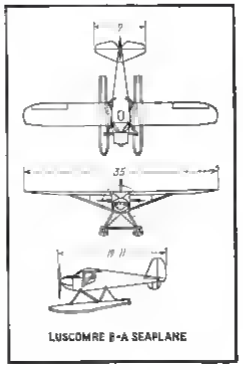
CONSTRUCTION MATERIAL: Spars are of almuminum alloy "I" section, aluminum alloy ribs, fabric covering material, fuselage Alclad monocoque.

STANDARD EQUIPMENT: Contains the following: airspeed tachometer, altimeter, oil temperature gage, compass (extra).

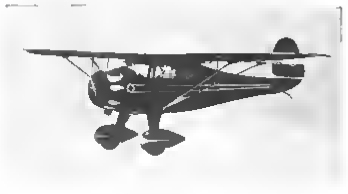
Engine Mount

(For further specifications see table pg. 105)

A. T. C. No. 694



LUSCOMBE 8-A SEAPLANE



MONOCOUPE Model 90 A

SPECIFICATIONS: Span 32 ft., overall length 20 ft. 6 in., overall height 6 ft. 11 in., landing gear tread 87.5 in., Wing loading 12.2 lb. per sq. ft., power loading 17.0 lb. per hp., weight empty 973, gross weight 1,410 lb. Powered by a Lambert engine rated at 90 hp. at sea level, fuel capacity 28 gallons, normal range 600 miles, fuel consumption at cruising speed 4.8 gallons per hr., diameter of propeller 78 in., wing area (including ailerons) 132.2 sq. ft., total ailerons area 13.5 sq. ft., fin area 4.1 sq. ft., rudder area 5.8 sq. ft., stabilizer area 10.6 sq. ft., total elevators area 9.2 sq. ft. Seats 2.

PERFORMANCE: High speed 130 m.p.h., at sea level, cruising speed 110 m.p.h. at sea level, stalling speed 40 m.p.h., climb at sea level 900 ft. per minute, service ceiling 15,000 ft.

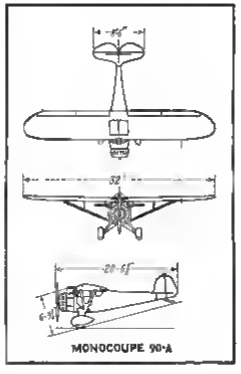
CONSTRUCTION MATERIAL: Spars are of solid spruce, wood ribs, fabric covering material, Ehert Hatch wheels size 6.50 x 10, Ehert Hatch mechanical brakes, shock cord landing gear unit, fuselage of welded steel tubing with fabric covering.

STANDARD EQUIPMENT: This model is equipped with the following instruments: airspeed, altimeter, oil temperature; Airpath Instituta compass; Aeromarine tachometer.

Steerable Tail Wheel

(For further specifications see table pg. 105)

A. T. C. No. 306



MONOCOUPE 90-A

NAUGLE Model Mercury N-1

SPECIFICATIONS: Span 30 ft., overall length 21 ft. 8 in., overall height 6 ft. 8 in., the landing gear tread 84 in., wing loading 8.5 lb. per sq. ft., power loading 13.3 lb. per hp., empty weight 610, gross weight 1,150 lb. It is powered by a Lycoming engine, total rated hp. 75 at sea level, fuel capacity 15 gallons, normal range 450 miles, fuel consumption at cruising speed 4.6 gallons per hr., diameter of propeller 72 in., wing area (including ailerons) 125 sq. ft., total ailerons area 14 sq. ft., fin area 5.1 sq. ft., rudder area 6.8 sq. ft., stabilizer area 13.5 sq. ft., total elevators area 8.8 sq. ft. Seats two.

PERFORMANCE: High speed 145 m.p.h., at sea level, cruising speed 130 m.p.h. at sea level, stalling speed 45, climb at sea level 1,200 ft. per minute, service ceiling 20,000 ft.

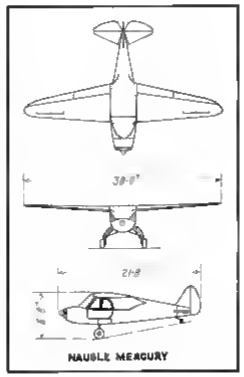
CONSTRUCTION MATERIAL: Alclad wing spars, aluminum alloy ribs, fabric covering material, fixed landing gear, Shimo hydraulic brakes, shock cord unit, Firestone wheels 6.00 x 6, fuselage monocoque Alclad.

STANDARD EQUIPMENT: This model is equipped with the following instruments: air speed, sensitive altimeter, oil pressure, oil temperature, gages, compass, tachometer.

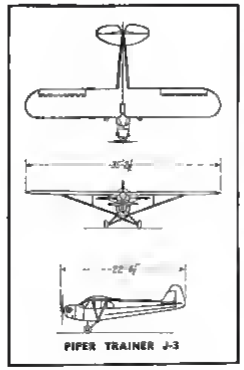
Wing Spar Construction

(For further specifications see table pg. 105)

No. A. T. C.



NAUGLE MERCURY



PIPER TRAINER J-3

SPECIFICATIONS: Span 35 ft. 2½ in., length overall 22 ft. 5 in., height overall 6 ft. 8 in., landing gear tread 71 in. Wing loading 5.6 lb. per sq. ft., power loading 25 lb. per hp., weight empty 574 lb., gross weight 1,000 lb. It is powered by a Continental A-40 engine. Total rated hp. 40 at sea level, fuel capacity 6 gal., normal range 200 mi., fuel consumption at cruising speed 3 gal. per hr., propeller diameter 69 in. Wing area (including ailerons) 178.5 sq. ft., aileron area (total) 19.2 sq. ft., fin area 4.02 sq. ft., rudder area 6.55 sq. ft., stabilizer 14.65 sq. ft., total elevator area 10.64 sq. ft.

PERFORMANCE: High speed 85 m.p.h. at sea level, cruising speed 70 m.p.h. at sea level, stalling speed 38 m.p.h., climb at sea level 400 ft. per min., service ceiling 10,000 ft. Seats 2.

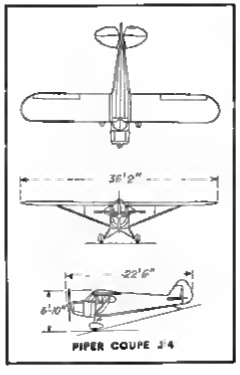
CONSTRUCTION MATERIAL: Wings have solid spruce spars, aluminum alloy ribs, fabric covering. Fixed landing gear, Hayes wheel 8.00 x 4, Rusco landing gear shock unit, solid tail unit, welded steel tubing with fabric covered fuselage.

STANDARD EQUIPMENT: Instruments: Aeromarine airspeed, Aeromarine altimeter, Waltham tachometer, U. S. Gauge Co. oil pressure, U. S. Gauge Co. oil temperature, Goodrich tires, Sensenich propeller, Rusco shock cord. This model is powered also by either Franklin or Lycoming 50 hp., or Continental 50, 60 and 75 hp. engines.

A. T. C. No. 660

PIPER Model J-3 Trainer

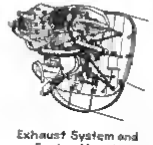
(For further specifications see table pg. 105)



PIPER COUPE J-4

SPECIFICATIONS: The span is 36 ft. 2 in., overall length 22 ft. 6 in., overall height 6 ft. 10 in., the landing gear tread 77 in., wing loading 7.1 lb. per sq. ft., power loading 20.0 lb. per hp., empty weight 800, gross weight 1,301 lb. This model is powered by a Lycoming O-145 engine, rated hp. 65 at sea level, fuel capacity 16 gallons, normal range 382 miles, fuel consumption at cruising speed 4.0 gallons per hr., diameter of propeller 70 in., area of wing (including ailerons) is 183.0 sq. ft., total ailerons 19.2 sq. ft., fin 4.66 sq. ft., rudder 6.76 sq. ft., stabilizer 14.66 sq. ft., total elevators 10.64 sq. ft. Seats 2.

PERFORMANCE: High speed 100 m.p.h., at sea level, cruising speed 87 m.p.h. at sea level.



Exhaust System and Engine Mount

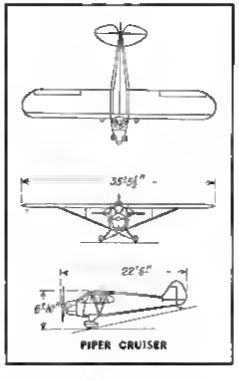
A. T. C. No. 721

PIPER Model J-4 Coupe

Stalling speed 41 m.p.h., climb at sea level 600 ft. per minute, service ceiling 12,000 ft.

CONSTRUCTION MATERIAL: Solid spruce spars, aluminum alloy ribs, fabric covering material, fixed type landing gear, Hayes 8.00 x 4, Palmer hydraulic brakes. Oleo landing gear shock unit, fuselage steel tubing welded with fabric covering.

(For further specifications see table pg. 105)



PIPER CRUISER

SPECIFICATIONS: Span 35 ft. 5½ in., overall length 22 ft. 6 in., overall height 6 ft. 10 in., landing gear tread 74½ in., wing loading 8.1 lb. per sq. ft., power loading 19.4 lb. per hp., empty weight 750, gross weight 1,450 lb., powered by an A-75 Continental or Lycoming geared O-145 engine, total rated hp. 75, at sea level, fuel capacity 18 gallons, normal range 320 miles, fuel consumption at cruising speed 4.6 gallons per hour. Diameter of propeller 72 in., with Continental model. Area of wing (including ailerons) 179 sq. ft., total ailerons area 19.2 sq. ft., fin area 4.02 sq. ft., rudder area 6.76 sq. ft., stabilizer area 14.65 sq. ft., total elevator area 10.64 sq. ft. Seats 3.

PERFORMANCE: High speed 100 m.p.h. at sea level, cruising speed 87 m.p.h. at sea level, stalling speed 42 m.p.h., climb at sea level 450 ft. per minute, service ceiling 10,000 ft. Continental powered.

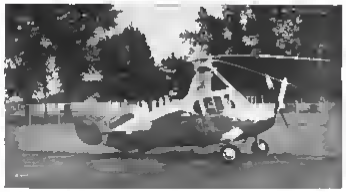
CONSTRUCTION MATERIAL: Solid spruce wing spars, aluminum alloy ribs, fabric covering material, fixed type of landing gear, Hayes wheel size 8.00 x 4, Palmer hydraulic brakes, Rusco landing gear shock unit, fuselage constructed of welded steel tubing, fabric covering.

A. T. C. No. 725

PIPER Model J-5 Cruiser

STANDARD EQUIPMENT: Aeromarine airspeed, Aeromarine altimeter, U. S. Gauge Co. oil pressure and oil temperature instruments, Airpath Institute Co. compass, Waltham tachometer, Cub and Goodrich tires, hydraulic brakes.

(For further specifications see table pg. 105)



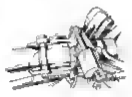
FITCAIRN Model PA 36

SPECIFICATIONS: Span 43 ft., overall length 20 ft. 6 in., overall height 10 ft. 3½ in., landing gear tread 84 in., wing loading 142 lb. per sq. ft., power loading 11.7 lb. per hp., weight empty 1,425, gross weight 2,050 lb., this model is powered by a Warner engine with total rated hp. 175 at sea level, fuel capacity 36 gallons, normal range 375 miles, fuel consumption at cruising 10 gallons per hour, diameter of propeller 92 in., area of motor disc is 1.452 sq. ft. Ea 24.4 sq. ft., rudder 5.2 sq. ft., stabilizer 12.4 sq. ft., total elevators 5.4 sq. ft. Seats two.

PERFORMANCE: High speed 121.7 m.p.h. at sea level, cruising speed 102 m.p.h. at sea level, stalling speed 0.0 m.p.h., climb at sea level 805 ft. per minute, service ceiling 15,000 ft.

CONSTRUCTION MATERIAL: Steel tubing spars, plywood ribs, plywood covering material, Oleo type landing gear, Beadix wheel 20 x 4, Beadix hydraulic brakes, Beadix Oleo landing gear shock unit and tail unit.

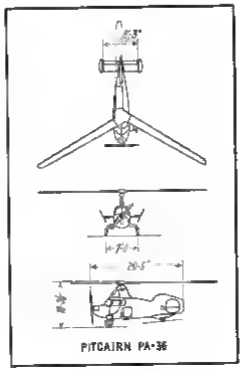
STANDARD EQUIPMENT: This model contains the following equipment: engine tachometer, oil temperature and pressure gages, airspeed indicator, altimeter, compass, electric rotor tachometer.



Rotor Blade Hub

(For further specifications see table p. 105)

No. A.T.C.



FITCAIRN PA-36

PORTERFIELD Model LP-65

SPECIFICATIONS: Span 34 ft. 3 in., overall length 22 ft. 7 11/16 in., overall height 7 ft., landing gear tread 69 in., wing loading 6.9 lb. per sq. ft., power loading 17.9 lb. per hp., weight empty 675, gross weight 1,160 lb., this model is powered by a Lycoming engine total rated hp. 65 at sea level, fuel capacity 13.5 gallons, normal range 290 miles, fuel consumption at cruising speed 4.5 gallons per hr., diameter of propeller 69 in., wing (including ailerons) 168.8 sq. ft., total ailerons 19.1 sq. ft., fin 6.38 sq. ft., rudder 6.84 sq. ft., stabilizer 10.57 sq. ft., total elevators 11 sq. ft. Seats two.

PERFORMANCE: High speed 100 m.p.h., cruising speed 98 m.p.h., stalling speed 33 m.p.h., climb 560 ft. per min., service ceiling 15,000 ft.

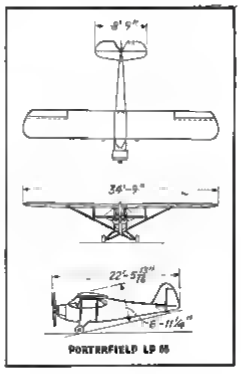
CONSTRUCTION MATERIAL: Spruce wing spars, spruce ribs, fabric covering material, Shinn wheel 6.00.6, mechanical Shinn brakes, welded steel tubing fuselage with fabric covering.

STANDARD EQUIPMENT: Steerable tail wheel, dual controls, tachometer, altimeter, airspeed, oil temperature, pressure gages, outside air drain, outside fuel drain, dual fuel shutoff.

(For further specifications see table p. 105)

Landing Gear Bracing

A.T.C. No. 720



PORTERFIELD LP-65

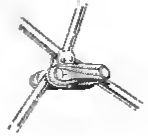
PORTERFIELD Model 90

SPECIFICATIONS: Span 22 ft., overall length 20 ft. 3 in., overall height 6 ft. 8¾ in., landing gear tread 69.5 in., wing loading 9.0 lb. per sq. ft., power loading 14.7 lb. per hp., weight empty 826 lb., gross weight 1,326 lb., powered by a Warner engine with total rated hp. 90 at sea level, fuel capacity 18 gallons, normal range 330 miles, fuel consumption at cruising speed 6.5 gallons per hour, diameter of propeller 80 in., wing area (including ailerons) 147 sq. ft., total ailerons 17.16 sq. ft., fin 5.16 sq. ft., rudder 6.33 sq. ft., stabilizer 13.2 sq. ft., total elevators 9.85 sq. ft. Seats two.

PERFORMANCE: High speed 133 m.p.h., at sea level, cruising speed 120 m.p.h., at sea level, stalling speed 40 m.p.h., climb at sea level 1050 ft. per minute, service ceiling 20,000 ft.

CONSTRUCTION MATERIAL: Spruce wing spars, spruce ribs, fabric covering material, Shinn wheel 6.00.6, mechanical Shinn brakes, welded steel tubing, fabric fuselage.

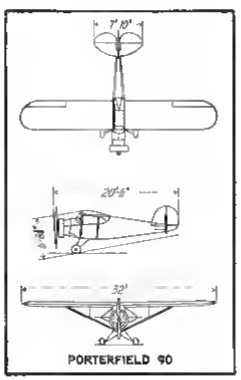
STANDARD EQUIPMENT: Airspeed indicator, oil temperature, oil pressure gages, tachometer, altimeter, compass, dual brakes, navigation lights, steerable tail wheel, shock covers.



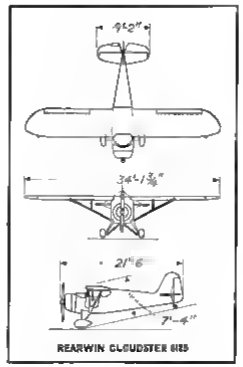
Shock Absorber

(For further specifications see table p. 105)

A.T.C. No. 611



PORTERFIELD 90



REARWIN CLOUDSTER 8125

SPECIFICATIONS: Span 34 ft. 1⅜ in., overall length 21 ft. 6 in., overall height 7 ft. 4 in., landing gear tread 80 in., wing loading 10.73 lb. per sq. ft., power loading 14.35 lb. per hp., weight empty 1,070, gross weight 1,734 lb. This model is powered by a Ken Rayce engine, total rated hp. 120 at sea level, fuel capacity 24 gallons, normal range 625 miles, fuel consumption at cruising speed 7 gallons per hour, area of wing (including ailerons) 161.8 sq. ft., total ailerons 13.13 sq. ft., fin 8.35 sq. ft., rudder 5.75 sq. ft., stabilizer 13.94 sq. ft., total elevators 11.56 sq. ft. Seats two.

PERFORMANCE: High speed 145 m.p.h., at an altitude of 800 ft., cruising speed 125 m.p.h. at an altitude of 800 ft., stalling speed 48 m.p.h., climb at sea level 1,000 ft. per minute, service ceiling 17,000 ft.

CONSTRUCTION MATERIAL: Wing spars are of

A.T.C. No. 711

REARWIN Model Cloudster 8125

solid spruce, spruce ribs, fabric covering material, landing gear is of fixed type, Goodyear wheels 18 x 8.3, Goodyear mechanical brakes, hydraulic landing gear shock unit, wheel tail unit, fuselage is of welded steel tubing, fabric covered.

STANDARD EQUIPMENT: This model contains the following instruments: tachometer, airspeed, oil pressure, oil temperature gages, altimeter, compass, switch.

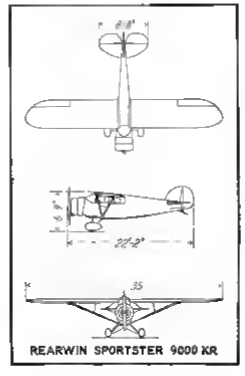
(For further specifications see table p. 105)

REARWIN Model Sportster 9000KR

SPECIFICATIONS: Span 35 ft., overall length 22 ft. 3 in., overall height ft. 9 in., landing gear tread 72 in., wing loading 8.8 lb. per sq. ft., power loading 16.2 lb. per hp., empty weight 830, gross weight 1,460, this model is powered by a Ken Rayce engine total rated hp. 90 at sea level, fuel capacity 24 gallons, normal range 500 miles, fuel consumption at cruising speed 5.0 gallons per hour, diameter of propeller 76 in., area of wing (including ailerons) is 166 sq. ft., total ailerons 19.75 sq. ft., fin 5.17 sq. ft., rudder 6.92 sq. ft., stabilizer 15.04 sq. ft., total elevators 12.12 sq. ft. Seats two.

PERFORMANCE: The high speed is 125 m.p.h. at an altitude of 800 ft., cruising speed 112 m.p.h. at an altitude of 800 ft., stalling speed 38 m.p.h., climb at sea level 1,000 ft. per minute, service ceiling 15,000 ft.

Landing Gear Bracing



REARWIN SPORTSTER 9000 KR

A.T.C. No. 591

CONSTRUCTION MATERIAL: Wings spars are of solid spruce, spruce ribs fabric covering material, landing gear is of fixed type, Goodyear wheel 18 x 8.3, Goodyear mechanical brakes, hydraulic landing gear shock unit, wheel tail unit, fuselage of welded steel tubing, fabric covered.

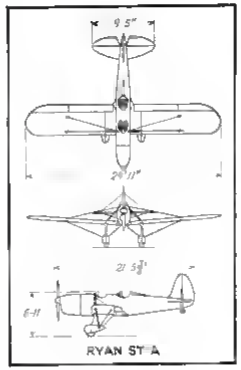
(For further specifications see table p. 105)

RYAN AERONAUTICAL Model ST A

Goodyear wheels 18 x 8.3, Goodyear mechanical brakes, Oleo landing gear shock unit, wheel tail unit, aluminum alloy monocoque fuselage.

STANDARD EQUIPMENT: Altimeter, compass, tachometer, air-speed, air pressure, oil temperature gages, fuel gage. Available as a land or seaplane—see photo and 3 view.

(For further specifications see table p. 105)



RYAN ST-A

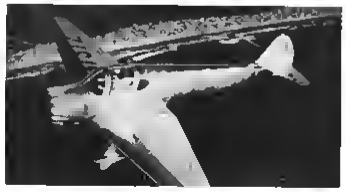
SPECIFICATIONS: Span 20 ft. 11 in., overall length 21 ft. 5⅝ in., overall height 6 ft. 11 in., landing gear tread 66 in., wing loading 12.9 lb. per sq. ft., power loading 12.8 lb. per hp., weight empty 1,031, gross weight 1,600 lb. this model is powered by a Menasco engine, total rated hp. 125 at sea level, fuel capacity 24 gallons, normal range 360 miles, fuel consumption at cruising speed 8.0 gallons per hour, diameter of propeller 80 in., area of wing (including ailerons) 124.0 sq. ft., total ailerons 12 sq. ft., fin 4.7 sq. ft., rudder 7.2 sq. ft., stabilizer 12 sq. ft., total elevators 10 sq. ft.

PERFORMANCE: High speed 126 m.p.h. at sea level, cruising speed 115 m.p.h. at an altitude of 3,000 ft., stalling speed 54 m.p.h., climb at sea level 800 ft. per minute, service ceiling 16,000 ft. Seats two.

CONSTRUCTION MATERIAL: Solid spruce wing spars, aluminum alloy ribs, fabric covering material, fixed type landing gear.

Guy Wire Fitting

A.T.C. No. 571



RYAN Model No. S-C

SPECIFICATIONS Span 37 ft 6 in., overall length 25 ft. 4½ in., landing gear tread 96⅝ in. Wing loading 10.7 lb per sq. ft., power loading 14.8 lb per hp., weight empty 1,345 lb., gross weight 2,150 lb. It is powered by a Warner engine. Total rated hp 145 at S. L. Fuel capacity 37 gal., normal range 525 miles fuel consumption at cruising speed 9.5 gal per hr.

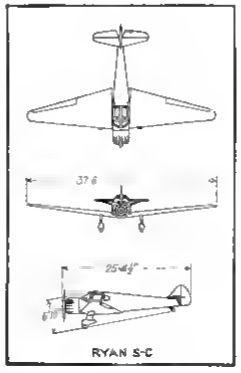
Propeller diameter is 82 in., wing area (including ailerons) 202 sq. ft., ailerons (total) 16.2 sq. ft., fin 5.1 sq. ft., rudder 6.6 sq. ft., stabilizer 14.3 sq. ft. total elevators 11.8 sq. ft.

PERFORMANCE High speed 150 m.p.h. at sea level, cruising speed 135 m.p.h. at 8,500 ft., stalling speed 45 m.p.h. Climbs at sea level 900 ft. per min. Service ceiling 17,200 ft.

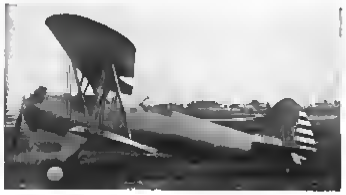
CONSTRUCTION MATERIAL Wings have steel spars, aluminum alloy ribs, Alclad and fabric covering material. Fixed type landing gear, Goodyear 18 x 8.3 wheel. Goodyear mechanical brakes, Oleo landing gear and shock unit, wheel tail unit, aluminum alloy monocoque fuselage. Plexiglas is used for cockpit enclosures, landing light covers, and similar transparent sections. Seating capacity two.

(For further specifications see table p. 185)

A. T. C. No. 658



RYAN S-C



ST. LOUIS AIRCRAFT Model PT-1

SPECIFICATIONS Span 33 ft. 10 in., overall length 21 ft. 5 in., overall height 9 ft. 3 in., wing loading 9.4 lb per sq. ft., power loading 12.3 lb per h.p., weight empty 2,055, gross weight 2,750 lb. Powered by a Wright engine, with a rating of 225 hp at sea level fuel capacity 42 gallons, normal range 350 miles, fuel consumption at cruising speed of 13.9 gallons per hour, wing area (including ailerons) 207 sq. ft. Seats two.

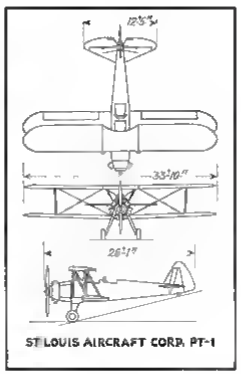
PERFORMANCE It has a high speed of 180 m.p.h., at sea level, and a cruising speed of 116 m.p.h. at sea level, stalling speed of 53 m.p.h., climb at sea level 880 feet per minute, service ceiling 15,000 feet.

CONSTRUCTION MATERIAL The wings are made of aluminum alloy spars, aluminum alloy tubing ribs and fabric covering. The fuselage is of monocoque type. Streamline landing gear wheels, size 24 in., Bendix hydraulic brakes, Aerol shock unit, and Aerol tail unit.

STANDARD EQUIPMENT Includes the following instruments: 2 Elgin clocks, 2 Pioneer altimeters, 2 Jaeger tachometers, 2 Cons. engine gauge, 1 Pioneer rate-of-climb, 1 Pioneer compass, 1 Pioneer bank and turn accessories include Lord instrument shock mountings, General tires, Bendix brakes, Hamilton Standard propeller, Bendix seats, push pull controls, ball bearings, Aeral shock strut.

(For further specifications see table p. 185)

No. A. T. C.



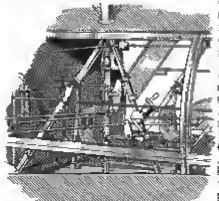
ST. LOUIS AIRCRAFT CORP. PT-1

SOUTHERN AIRCRAFT SM-10A

SPECIFICATIONS Span 34 ft. 1 in., overall length 25 ft. 2 in., height overall 9 ft. 6 in., 90.16 in. landing gear tread, wing loading 9.16 lb per sq. ft. power loading 12.4 lb. per hp., weight empty, 2,050 lb., gross weight 2,790 lb. The Lycoming engine is rated at 225 hp., the fuel capacity is 42 gallons normal range is 355 miles diameter of the propeller is 102 in. Seats two.

PERFORMANCE High speed 123 m.p.h., cruising speed 105 m.p.h., stalling speed 50 m.p.h., climb at sea level 850 ft. per minute, service ceiling 15,000 ft.

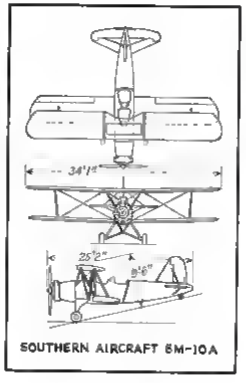
STANDARD EQUIPMENT Includes air speed indicator, altimeter, tachometer, ignition switch, oil pressure gage, oil thermometers, engine gage, compass, clock, accessories include Lord instrument shock mountings, General tires, Air Associates brakes, Curtiss Reed propeller, Bendix seats, Southern controls, Fafnir bearings, Cleveland or Bendix shock strut, Pyle Nat. lights, etc.



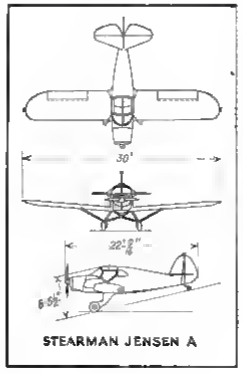
Cabane Strut Bracing

For further specifications see table p. 185)

No. A. T. C.



SOUTHERN AIRCRAFT SM-10A



STEARMAN JENSEN A

SPECIFICATIONS Span 30 ft., overall length 22 ft. 7½ in., height overall 6 ft. 5½ in. landing gear tread 67 in., wing loading 8.68 lb per sq. ft., power loading 17.63 lb per hp., weight empty 618 lb., gross weight 1,146 lb. The Lycoming engine is rated at 65 hp. at sea level. fuel capacity 20 gallons, normal range 450 miles fuel consumption 4.7 gallons per hour. diameter of the propeller is 10 in. Area of wing (including ailerons) 132 sq. ft., total ailerons 14.58 sq. ft., fin 4.32 sq. ft., rudder 6.27 sq. ft., stabilizer 11.04 sq. ft., total elevators 11.22 sq. ft.

PERFORMANCE High speed 115 m.p.h. at sea level, cruising speed 105 m.p.h. at sea level, stalling speed 45 m.p.h. at sea level, climb at sea level 750 ft. per minute, service ceiling 14,000 ft.

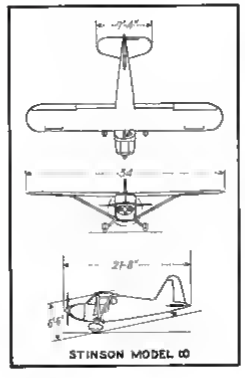
Landing Gear

No. A. T. C.

STEARMAN JENSEN A

STANDARD EQUIPMENT Includes following instruments U. S. Gage Altimeter, U. S. Air Speed Stewart Warner engine gage unit, Basco ignition switch; accessories include shock mount lugs, Firestone tires, Wheel Brakes, Freedman Bornbam propeller, stick controls, Fafnir control bearings, Grimes lights, wheel pants, tail wheel, etc. Seats two.

(For further specifications see table p. 185)



STINSON MODEL 10

SPECIFICATIONS Span 34 ft., overall length 21 ft. 8 in., overall height 6 ft. 0 in., landing gear tread 84 in., wing loadlog 10.5 lb per sq. ft., power loading 18 lb. per hp., weight empty 1,018 gross weight 1,625 lb. Has Franklin engine with a rating of 90 hp at sea level, fuel capacity 20 gallons per hour, diameter of propeller 72 in.

PERFORMANCE High speed 135 miles per hour at sea level, cruising speed 110 miles per hour at sea level, stallog speed 43.5 miles per hour, climb at sea level 600 ft. per minute service ceiling 14,000 ft.

CONSTRUCTION MATERIAL Wing spars are of solid spruce, wing covered with fabric, wheel size is Hayes 6.00 x 6, Goodrich hydraulic brakes Oleo-spring landing gear shock unit, wheel tail unit, welded steel tubing fuselage, fabric covered the weight empty of the Standard model is 954 lb. the landing gear is of fixed type 84 in. tread wheel size is Hayes 6 x 6. Goodrich hydraulic brakes landing gear shock unit is Oleo-spring. fuselage is welded steel tubing with fabric covering.

No. A. T. C.

STINSON Model Super Deluxe

STANDARD EQUIPMENT Includes for Super-Deluxe the following: dual magneto, navigation lights hydraulic brakes, parking brakes, compass, steerable tail wheel, engine driven generator, sound proofing, springdraulic shock absorbers.

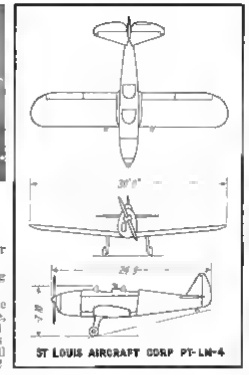
(For further specifications see table p. 185)

ST. LOUIS AIRCRAFT PT-LM-4 No. A. T. C.

SPECIFICATIONS It is equipped with a Ranger engine, rated at 180 hp. at sea level.

PERFORMANCE High speed 137 m.p.h., cruising speed 125 m.p.h. both at sea level.

STANDARD EQUIPMENT Includes Aeronautic clocks, altimeters, tachometers, engine gage, rate-of-climb compass and Pioneer bank and turn instruments. General tires and brakes Sensenich propeller, Bendix seats, push pull controls, ball bearings. Oleo shock strut. Seats 2.



ST. LOUIS AIRCRAFT CORP. PT-LM-4

WHITE Model PT 7 No. A. T. C.

SPECIFICATIONS Span 31 ft., overall length 24 ft. 5¾ in., overall height 8 ft. 9 in. wing loading 9.27 lb. per sq. ft., power loading 13.6 lb per hp. gross weight 2,243 lb. powered by a Warner or Kanner fuel capacity 36 gallons, normal range 332.5 miles wing area (including ailerons) 242.5 sq. ft. total ailerons 27.6 sq. ft.

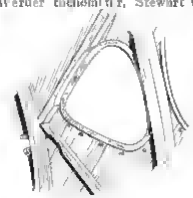
PERFORMANCE High speed 115 m.p.h., cruising speed 95 m.p.h., stalling speed 40 m.p.h., climb at sea level 1,000 ft. per minute.

(For further specifications see table p. 185)

SUMMIT AERONAUTICAL CORP. Model HM-5

SPECIFICATIONS Span 27 ft., overall length 22 ft., overall height 7 ft. 4 in., landing gear tread 80 in., wing loading 11.25 lb. per sq. ft., power loading 18 lb. per hp., weight empty 825 lb., gross weight 1,350 lb. The Continental engine is rated at 75 hp. at sea level. Its fuel capacity is 18 gallons, it has a normal range of 480 miles, fuel consumption at cruising speed is 4.7 gallons per hour, the diameter of the propeller is 70 in., area of the wing (including ailerons) is 120 sq. ft., total ailerons—10 sq. ft., fin 5.5 sq. ft. rudder 7.8 sq. ft., stabilizer 12.1 sq. ft., total elevators 8.1 sq. ft. Seats two. PERFORMANCE High speed of 137 m.p.h., at sea level, cruising speed of 125 m.p.h., at sea level, stalling speed 42 m.p.h., climb at sea level 800 ft. per minute, service ceiling 16,000 ft.

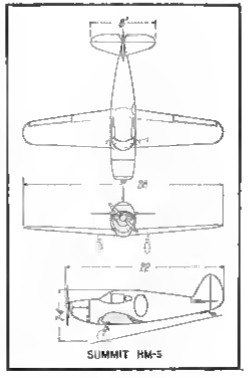
CONSTRUCTION MATERIAL Plastic spruce wing spars, plywood ribs, plywood covering. STANDARD EQUIPMENT Instruments: U. S. Gage air speed, U. S. Gage altimeter, Stewart Warner tachometer, Stewart Warner oil pressure gage, Stewart Warner oil temperature gage, Bendix Scintilla magneto switch, accessories: Firestone tires, Hayes brakes, Freedman, Burnham propeller, Fafnir bearings.



Window Installation

No. A. T. C.

(For further specifications see table pg. 185)



SUMMIT HM-5

TAYLORCRAFT Model BC 12-65

SPECIFICATIONS Span 36 ft., length overall 22 ft., height overall 6 ft. 10 in., wing loading 7.1 lb. per sq. ft., power loading 18.4 lb. per hp., weight empty 700 lb., gross weight 1200 lb. It is powered by a Continental engine, rated at 65 hp. at sea level, fuel capacity 18 gallons, normal range 375 miles, fuel consumption at cruising speed 4 gallons per hour. The propeller measures 72 inches in diameter. The wing area (including ailerons) is 169 sq. ft. Seats two.

PERFORMANCE High speed 105 m.p.h. at sea level, cruising speed 95 m.p.h. at sea level, stalling speed 38 m.p.h., climb at sea level 600 ft. per minute, service ceiling 15,000 ft.

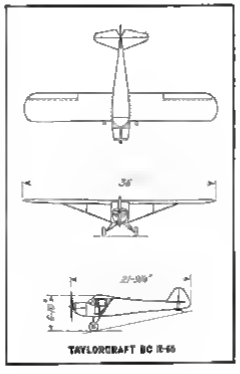
CONSTRUCTION MATERIAL Wing spars are of solid spruce, metal ribs, fabric covering. Welded steel tubing, fabric covered fuselage. Wheel tail unit.

STANDARD EQUIPMENT Dual ignition engine, wooden propeller, Sbinn Wheels with Brakes, Taylorcraft compass, full swivel tail wheel, parking brake, air speed indicator, altimeter, oil temperature gage, oil pressure gage, tachometer.

Wing Fitting

(For further specifications see table pg. 185)

A. T. C. No. 696



TAYLORCRAFT BC 12-65

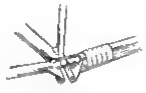
TAYLORCRAFT Model BL-T Trainer

SPECIFICATIONS Span 30 ft., overall length 22 ft., height overall 6 ft. 10 in., wing loading 11.8 lb. per sq. ft., power loading 23.0 lb. per hp., weight empty 682 lb., gross weight 1,150 lb. It is powered by a Lycoming engine, rated at 50 hp. at sea level, fuel capacity 12 gallons, normal range 270 miles, fuel capacity at cruising speed 3.5 gallons per hour. Wing area (including ailerons) 109.0 sq. ft.

PERFORMANCE High speed 97 m.p.h. at sea level, cruising speed 88 m.p.h. at sea level, stalling speed 38 m.p.h. Climb at sea level 450 ft. per minute. Service ceiling 13,000. Seats two.

CONSTRUCTION MATERIAL Wing spars are of solid spruce, metal ribs, fabric covering material, shock cord landing gear unit, skid tail unit. Welded steel tubing fabric covered fuselage.

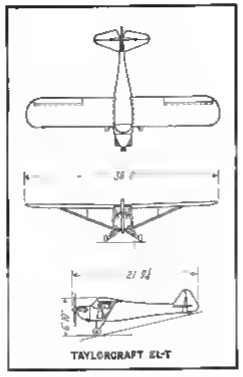
STANDARD EQUIPMENT Single ignition engine, wooden propeller, Sbinn wheels, tachometer, oil pressure and temperature geges, altimeter, air speed indicator. Optional equipment: cabin heater, dual ignition, navigation lights and battery, stick type control.



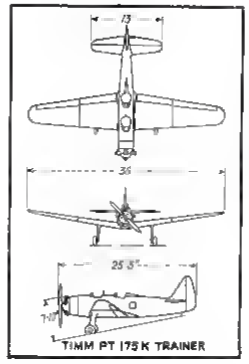
Rear Landing Gear Fitting

(For further specifications see table pg. 185)

A. T. C. No. 700



TAYLORCRAFT BL-T



TIMM PT 175K TRAINER

SPECIFICATIONS Span, 36 ft., overall length 25 ft. 5½ in., height overall 10 ft. 6 in., landing gear tread 109¾ in., wing loading 13.15 lb. per sq. ft., power loading 13.7 lb. per hp., weight empty 1700 lb., gross weight 2400 lb. It is powered by a Kinner engine rated at 175 hp. at sea level, fuel capacity 40 gallons, normal range 400 miles, fuel consumption at cruising speed 10 gallons per hour. The propeller measures 90 in. in diameter. Area of wing (including ailerons) 182.25 sq. ft., total ailerons 20.75 sq. ft., fin 12.1 sq. ft., rudder 9.85 sq. ft., stabilizer 24.66 sq. ft., total elevators 16.66 sq. ft. Seats two.

PERFORMANCE High speed 145 m.p.h. at sea level, cruising speed 126 m.p.h. at sea level, stalling speed 50 m.p.h., climb at sea level 900 ft. per minute, service ceiling 17,500 ft.

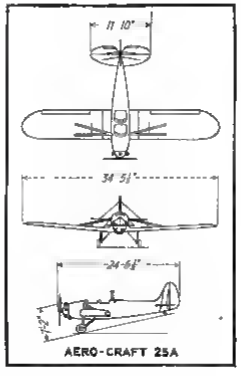
Landing Gear

No. A. T. C.

TIMM AIRCRAFT Model No. PT 175K

CONSTRUCTION MATERIAL The wing spars are boxed type, truss ribs covering material. The landing gear is of fixed type, Air Wheels 7.60 8. Shinn hydraulic brakes, Oleo boxed type shock unit, hydraulic tail unit, sprucn wood fuselage.

(For further specifications see table p. 185)



AERO-CRAFT 25A

SPECIFICATIONS Span 34 ft. 5.5 in., overall length 24 ft. 6.5 in., height overall 7 ft. 2.5 in., wing loading 10.9 lb. per sq. ft., power loading 13.5 lb. per hp., weight empty 1,302 gross weight 1,916 lb. powered by a Kinner engine, total rated 100 hp. at sea level, normal range 400 miles, wing area (including ailerons) 175 sq. ft. Seats two.

PERFORMANCE High speed 125 m.p.h. at sea level, cruising speed 115 m.p.h. at sea level, stalling speed 45 m.p.h., climb at sea level 1,100 ft. per minute, service ceiling 17,950 ft.

CONSTRUCTION MATERIAL Spars are of spruce, wood ribs, fabric covering material. Landing gear is of fixed type.

STANDARD EQUIPMENT Kinner R5 Series 2 engine rated 100 hp. at 1,850 r.p.m. at S.L.

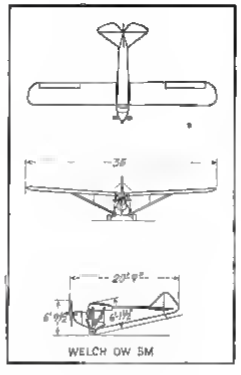
Wing Strut Bracing

A. T. C. No. 733

WALLY TIMM Model Aero-Craft

hydraulic brakes, dual controls, tachometer, altimeter, airspeed indicator, oil temperature gage, oil pressure gage, oil roll spring shock struts, tail wheel (steerable and full swived), 7.60 x 8 wheels and tires. Extra equipment: navigation lights, generator, engine cover, cockpit cover, compass, battery, starter.

(For further specifications see table p. 185)



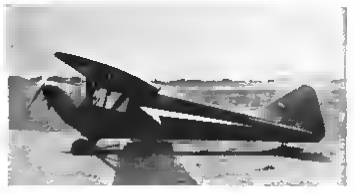
WELCH OW-5M

SPECIFICATIONS Span 34 ft. 4 in., overall length 20 ft. 6 in., overall height 7 ft., landing gear tread 56½ in., wing loading 6.6 lb. per sq. ft., power loading 25.7 lb. per hp., weight empty 528, gross weight 950 lb., powered by a Continental engine, total rated horse power 40 at sea level, fuel capacity 9 gallons, normal range 250 miles, fuel consumption at cruising speed 3 gallons per hour, diameter of propeller 66 in., wing area (including ailerons) 138.0 sq. ft., total aileron area 18.92 sq. ft., fin area 2.12 sq. ft., rudder area 9.13 sq. ft., stabilizer area 14.4 sq. ft., total elevator area 11.2 sq. ft. Seats two.

PERFORMANCE High speed 93 m.p.h. at sea level, cruising speed 85 m.p.h., at sea level, stalling speed 32 miles per hour, climb at sea level 460 feet per minute, service ceiling 12,000 ft.

Landing Gear

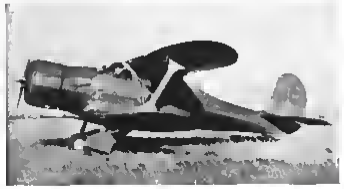
A. T. C. No. 637



WELCH Model OW-5M

CONSTRUCTION MATERIAL Spruce wing spars, ¾" section, basswood ribs fabric covering material, fixed type landing gear. Welch wheel size 16 x 4, solid landing gear shock unit, wheel tail unit, fuselage is constructed of welded steel tubing, fabric covered.

(For further specifications see table p. 185)



BEECH Model D 17 A

SPECIFICATIONS Span 32 ft., overall length 26 ft 7⅝ in., overall height 8 ft., landing gear tread 86 in., wing loading 14 17 lb. per sq ft., power loading 13.1 lb. per hp., weight empty 2,517, gross weight 4,250 lb., powered by a Wright Whirlwind engine, total rated hp 320 at sea level, fuel capacity 98 gallons, normal range 820 miles, fuel consumption at cruising speed 17 gallons per hour, diameter of propeller 99 in., wing area (including ailerons) 296.5 sq. ft., total aileron area 23.35 sq. ft., fin area 6.56 sq. ft., rudder area 8.7 sq. ft., stabilizer area 24.5 sq. ft., total elevator area 16.6 sq. ft.

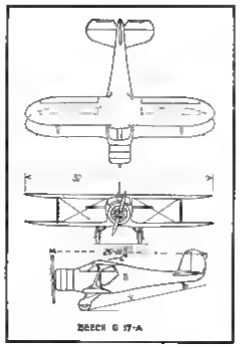
PERFORMANCE High speed 178 m.p.h. at sea level, cruising speed 150 m.p.h. at an altitude of 9,000 ft., stalling speed 50 m.p.h., climb at sea level 1,100 ft. per minute, service ceiling 15,500 ft.

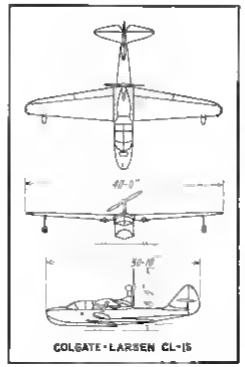
Landing Gear

CONSTRUCTION MATERIAL Solid spruce wing spars, spruce ribs, fabric covering, retractable type of landing gear, Goodyear wheel size 7.50 x 10, hydraulic brakes, Oleo spring landing gear shock unit, welded steel tubing, fabric covered fuselage. Seats 5.

(For further specifications see table p 109)

A. T. C. No. 713





SPECIFICATIONS Span 40 ft., overall length 30 ft. 10 in., height overall 8 ft. 5 in., landing gear tread 98¾ in. Wing loading 14.5 lb. per sq. ft., power loading 14.3 lb. per h.p., 1,750 lb. weight empty, gross weight 2,800 lb., powered by a Ranger engine with a rating of 200 h.p. at sea level, fuel capacity 55 gallons, normal range 500 miles, diameter of propeller 96 in. Wing area (including ailerons) 197.5 sq. ft., total ailerons 16.08 sq. ft., fin 14.41 sq. ft., rudder 9.98 sq. ft., stabilizer 18.58 sq. ft., total elevators 10.30 sq. ft.

PERFORMANCE High speed 140 miles per hour at sea level, cruising speed 125 miles per hour at sea level, stalling speed 50 miles per hour, climb at sea level 800 ft. per minute, service ceiling 14,500 ft. Seats 4.

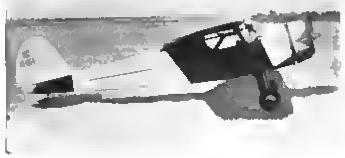
CONSTRUCTION MATERIAL Box wing spar 30 per cent chord; full web ribs; wing covering of plastic-bonded mahogany; fuselage is of modified NACA Model 35-B. Retractable type landing gear and tail wheel. Tail wheel 360 degree swivel.

STANDARD EQUIPMENT This model is equipped with the following instruments, airspeed indicator, altimeter, compass, oil temperature pressure gages, fuel pressure, temperature gages, eclipse electrical starter, tachometer, and necessories are the Lord engine mounting, Goodrich tires, Wood Hartzell propeller, Colgate Larsen seats, Colgate Larsen shock strut.

No. A. T. C.

COLGATE LARSEN Model CL 15

(For further specifications see table p 109)



CESSNA Model C-145

SPECIFICATIONS Span 34 ft. 2 in., overall length 24 ft. 8 in., overall height 7 ft., landing gear tread 87 in., wing loading 13.5 lb. per sq. ft., power loading 16.9 lb. per h.p., weight empty 1380 lb., gross weight 2450 lb. Powered by a Warner with Lord mountings with the rating of 145 h.p. at sea level, fuel capacity 35 gallons, normal range 325 miles, fuel consumption at cruising speed 9.5 gallons per hour, diameter of propeller 84 in. The wing (including ailerons) is 181.0 sq. ft., the total ailerons 12.35 sq. ft., fin 7.1 sq. ft., rudder 6.11 sq. ft., stabilizer 17.3 sq. ft., total elevators 13 sq. ft.

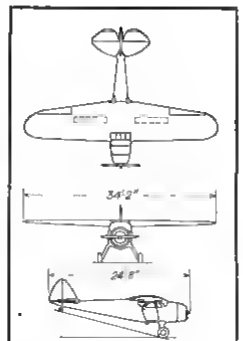
PERFORMANCE The high speed 162 miles per hour at sea level, cruising speed 151 miles per hour at an altitude of 8,000 ft., stalling speed 49 miles per hour, climb at sea level 1000 ft. per minute, service ceiling 18,000 ft.

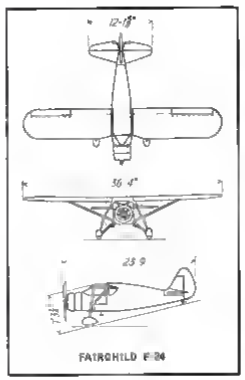
CONSTRUCTION MATERIAL Wing spars are of laminated spruce, spruce ribs, fabric and aluminum alloy covering materials, fuselage is of welded steel tubing with fabric covering. The landing gear is of fixed type, wheel size 6.50 x 10, also available with 21 in. streamlines or 22 x 10-4 wheels with Goodyear hydraulic brakes, Cessna Oleo shock asrt, wheel tail unit. Seats 4.

Tail Wheel

(For further specifications see table p 109)

A. T. C. No. 701

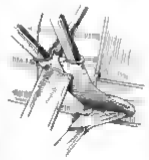




SPECIFICATIONS Span 30 ft. 4 in., overall length 23 ft. 9 in., height overall 8 ft., landing gear tread 111 in., wing loading 13.2 lb. per sq. ft., power loading 17.58 lb. per hp., 1482 lb. weight empty, 2550 lb. gross weight. It is powered by a Wright 145 h.p. engine at sea level, fuel capacity 60 gallons, normal range 520 miles, fuel consumption at cruising speed 9.5 gallons per hour, diameter of propeller 86 in. Wing area (including ailerons) 103.3 sq. ft., total ailerons 21 sq. ft., fin 6.1 sq. ft., rudder 10.1 sq. ft., stabilizer 21.9 sq. ft., total elevators 13.5 sq. ft.

PERFORMANCE High speed 135 miles per hour at sea level, cruising speed 122 miles per hour at an altitude of 5,000 ft., stalling speed 50 miles per hour, climb at sea level 720 miles per minute, service ceiling 15,700 ft. Seats 4.

CONSTRUCTION MATERIAL Spars of solid spruce, spruce ribs, fabric covering material, fuselage is of welded steel tubing with fabric covering.



Strut Bracing

A. T. C. No. 707

FAIRCHILD Model F 24

Plexiglas cockpit enclosures, landing-light lenses. The landing gear is of fixed type, wheel type is Hayes and size is 7.50 x 10. Palmer hydraulic brakes. Oleo landing gear shock unit, wheel tail unit. The Fairchild four-place F 24 W-40 has the same standard equipment as the F 24.

(For further specifications see table p 109)

CESSNA Model T-50 TWIN

SPECIFICATIONS Span 41 ft. 11 in., overall length 32 ft. 9 in., height overall 9 ft. 11 in., landing gear tread 151 in., wing loading 17.3 lb. per sq. ft., power loading 11.3 lb. per h.p. 3000 lb. weight empty 5100 lb. gross weight, powered by a Jacobs engine with a rating of 450 hp at sea level, fuel capacity 120 gallons, normal range 740 miles, fuel consumption at cruising speed 28 gallons per hour, diameter of propeller 93 in., wing area (including ailerons) 295 sq. ft., total ailerons 18 sq. ft., fin 10.9 sq. ft., rudder 14.9 sq. ft., stabilizer 40 sq. ft., total elevators 22.7 sq. ft. Seats five.

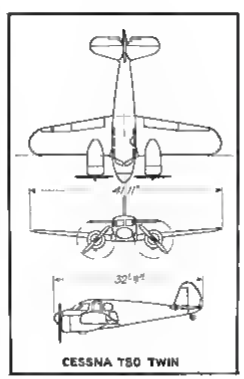
PERFORMANCE High speed 195 m.p.h. at sea level, cruising speed 191 m.p.h. at an altitude of 7500 ft., stalling speed 55 m.p.h., climb at sea level 1525 ft. per minute, service ceiling 22,000 ft.

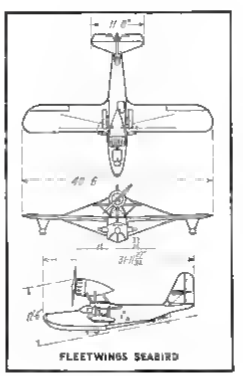
CONSTRUCTION MATERIAL Wing spars are of laminated spruce, spruce ribs, fabric and aluminum alloy covering materials, fuselage is of welded steel tubing. Plexiglas cockpit enclosures, landing light covers. The landing gear is retractable type, wheel size 8.50 x 10, Goodyear hydraulic brakes, Bendix Oleo landing gear shock unit, wheel tail unit.

(For further specifications see table p 109)

Wing Structure

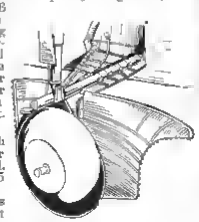
A. T. C. No. 722





SPECIFICATIONS Span 40 ft. 6 in., overall length 32 ft. height overall 12 ft. 6 in., landing gear tread 93½ in. Wing loading 15.96 lb. per sq. ft. power loading 12.5 lb. per h.p., 2,453.7 lb. weight empty, gross weight 3,750 lb. Powered by a Jacobs engine with a rating of 300 h.p. at sea level, fuel capacity 70 gallons, normal range 516 miles, diameter of propeller 102 in. Wing area (including ailerons) 235 sq. ft., total ailerons 23.3 sq. ft. fin 18.9 sq. ft., rudder 12.5 sq. ft., stabilizer 87 sq. ft., total elevators 15.1 sq. ft. Seats 4.

PERFORMANCE High speed 150 miles per hour at sea level, cruising speed 135 miles per hour, stalling speed 58 miles per hour, climb at sea level 914 ft. per minute, service ceiling 14,600 ft.



Retractable Gear

A. T. C. No. 680

FLEETWINGS Model F 501 Seabird

STANDARD EQUIPMENT This model is equipped with the following instruments: bank and turn, rate of climb, compass, engine gages, head temperature, altimeter, air speed and ammeter-voltmeter; has a two-position propeller and navigation and landing lights.

(For further specifications see table p 109)

GRUMMAN Model No. G 44 (Widgeon)

SPECIFICATIONS Span 40 ft., overall length 31 ft., overall height 9 ft., landing gear tread 90 in., wing loading 18.875 lb. per sq. ft., power loading 11.25 lb. per hp., weight empty 3,075 gross weight 4,500, powered by two Ranger engines with a total rating of 400 hp. at sea level, fuel capacity 308 gallons, normal range 735 miles, fuel consumption at cruising speed 20 gal-

lons per hour, wing area (including ailerons) 245 sq. ft., aileron area (total) 14.6 sq. ft., fin area 17.5 sq. ft., rudder area 14 sq. ft., stabilizer area 25.8 sq. ft., total elevator area 19.6 sq. ft. Seats five.

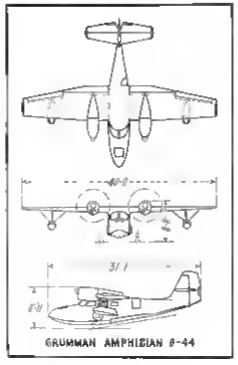
PERFORMANCE Cruising speed 150 miles per hour at an altitude of 3,000 ft., stalling speed 61 miles per hour, climb at sea level 850 ft. per minute, service ceiling 15,000 ft.

CONSTRUCTION MATERIAL Aluminum alloy box wing spars, aluminum alloy ribs, metal and fabric covering, retractable type landing gear, Hayes hydraulic brakes, Hayes wheels, size 7.50 x 10, Bendix Oleo landing gear shock unit, fuselage aluminum alloy.

STANDARD EQUIPMENT This model is equipped with the following: two sets of engine instruments, compass, air speed indicator, turn-and bank indicator, rate of climb, sensitive altimeter, two fuel quantity gages, voltammeter, standard Lear receiver and transmitter.

(For further specifications see table p. 106)

No. A. T. C.



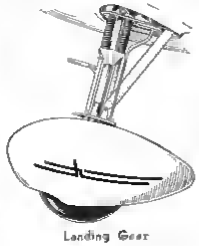
GRUMMAN AMPHIBIAN S-44

HOWARD Model DGA-15

SPECIFICATIONS Span 38 ft., overall length 26 ft. 2¼ in., overall height 8 ft. 5 in., landing gear tread 100 in., wing loading 20.7 lb. per sq. ft., power loading 13.6 lb. per hp., weight empty 2,500, gross weight 4,350 lb. Wright engine rated at 320 hp., fuel capacity 118 gallons, normal range 1,025 miles, fuel consumption at cruising speed 18.5 gallons per hour, diameter of propeller 90 in. Wing area (including ailerons) 210 sq. ft., total aileron area 18.54 sq. ft., fin area 11.72 sq. ft., rudder area 9.62 sq. ft., total elevator area 21.20 sq. ft.

PERFORMANCE Cruising speed 175 miles per hour at an altitude of 8,500 ft., stalling speed 60 ft., climb at sea level 1,050 ft. per minute, service ceiling 17,500 ft. Seats five.

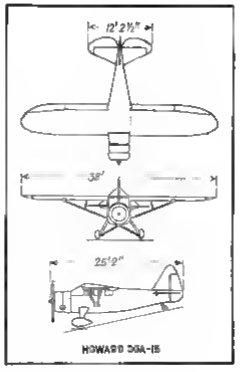
CONSTRUCTION MATERIAL Wing spars are of solid spruce; spruce ribs; plywood covering material; fuselage is of welded steel tubing covered with aluminum alloy and fabric; Plexiglas enclosures. The landing gear is of fixed type, wheel size 8.00 x 10; Goodyear hydraulic brakes.



Landing Gear

(For further specifications see table p. 106)

A. T. C. No. 717



HOWARD DGA-15

STINSON Model SR-10J

SPECIFICATIONS Span 41 feet 10½ inches, length overall 27 feet 10½ inches, height overall 8 feet 7 inches. Landing gear tread 111½ inches. Wing loading 16.0 pounds per square foot, power loading 14.6 pounds per horse power, weight empty 2,650 pounds, gross weight 4,150 pounds. It is powered by a Lycoming engine with Lord mountings. Total rated horse power 285 at sea level; fuel capacity 100 gallons

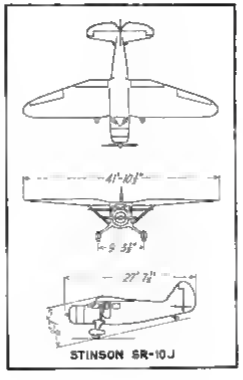
normal range 835 miles, fuel consumption at cruising speed 18.8 gallons per hour, propeller diameter 102 inches. Wing (including ailerons) 258.5 square feet; aileron area (total) 22.02 square feet, fin area 12.0 square feet; rudder area 15.16 square feet, stabiliser 25.08 square feet; total elevator area 19.75 square feet.

PERFORMANCE Cruising speed 155 miles per hour at 4,000 feet, stalling speed 60 miles per hour; climbs at sea level 1,040 feet per minute, service ceiling 15,800 ft. Seats 4 to 5.

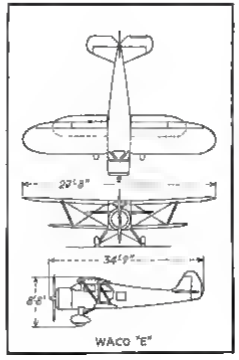
CONSTRUCTION MATERIAL Wings have welded steel tubing truss spars, Rusco aluminum alloy ribs, fabric covering; fixed landing gear, Hayes 7.50 x 10 wheels, Goodrich hydraulic brakes, Spring Oleo landing gear shock unit, wheel tail unit, welded steel tubing fabric covered fuselage.

(For further specifications see table p. 109)

No. A. T. C.



STINSON SR-10J

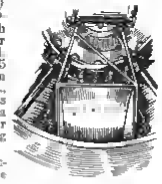


WACO "E"

SPECIFICATIONS Span of model SRE 34 ft. 9 in., overall length 25 ft. 8 in., overall height 8 ft. 8 in., landing gear tread 101 in., wing loading 17.06 lb. per sq. ft., power loading 10.5 lb. per hp., weight empty 2,734, gross weight 4,200. The Waco E is available with Lycoming, Jacobs, P. & W. or Wright engines. Powered by a P. & W. Wasp Jr., it has a rating of 400 hp. at 5,000 ft., fuel capacity 125 gallons, normal range 840 miles, fuel consumption at cruising speed 22.7 gallons per hour, wing area (including ailerons) 246 sq. ft. Seats 5.

PERFORMANCE High speed 200 miles per hour at sea level, cruising speed 195 miles per hour at an altitude of 6,000 ft., stalling speed 60 miles per hour, climb at sea level 1,550 ft. per minute, service ceiling 23,500 ft.

CONSTRUCTION MATERIAL Wing spars are of spruce, spruce ribs, plywood covering ma-



Air Intake Scoop

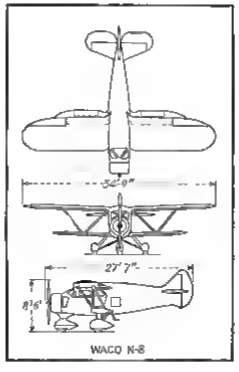
terial, the wheel size is 7.50 x 10, Goodyear hydraulic brakes, Waco Oleo landing gear shock unit, wheel tail unit.

STANDARD EQUIPMENT This model is equipped with the following instruments: compass, tachometer, altimeter, air speed, oil pressure, oil temperature and gas gages, manifold pressure, thermocouple and Lord instrument and engine mountings.

(For further specifications see table p. 107)

A. T. C. No. 714

WACO Model E



WACO K-8

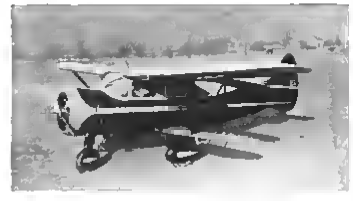
SPECIFICATIONS Span 34 ft. 9 in., overall length 27 ft. 7 in., height overall 8 ft. 6 in., landing gear tread 99 in., wing loading 15.45 lb. per sq. ft., power loading 12.07 lb. per hp., weight empty 2,564, gross weight 3,800 lb. Powered by a Jacobs engine with a rating of 300 hp. at altitude of 3,700 ft., fuel capacity 95 gallons, normal range 625 miles, fuel consumption at cruising speed 15.4 gallons per hour, wing area (including ailerons) 246 sq. ft.

PERFORMANCE High speed 161 miles per hour at sea level, cruising speed 151 miles per hour at an altitude of 8,500 ft., stalling speed 56 miles per hour, climb at sea level 950 ft. per minute, service ceiling 14,200 ft. Seats 5.

CONSTRUCTION MATERIAL Wing spars are of spruce, spruce ribs, fabric covering. The wheel size is 8.50 x 10, Goodyear hydraulic brakes, Waco Oleo landing gear shock unit.

Nose Wheel

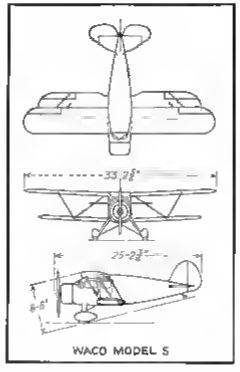
A. T. C. No. 677



WACO Model N

STANDARD EQUIPMENT This model is equipped with the following instruments: compass, tachometer, altimeter, air speed, oil pressure, oil temperature, gas gages, manifold press, thermocouple, Lord instrument mountings.

(For further specifications see table p. 109)



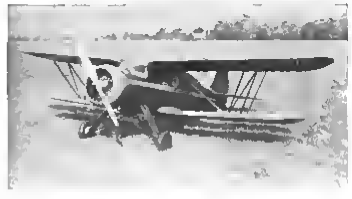
WACO MODEL S

SPECIFICATIONS The Waco S is available with Jacobs or Continental engines. Model YKS span 33 ft. 3 in., overall length 25 ft. 4 in., overall height 8 ft. 4 in., landing gear tread 102 in., wing loading 15.32 lbs. per sq. ft., power loading 14.44 lb. per hp., weight empty 1,945, gross weight 3,250. Powered by a Jacobs engine, with the rating of 225 hp. at sea level, fuel capacity 70 gallons, normal range 518 miles, fuel consumption at cruising speed 15.5 gallons per hour, wing area (including ailerons) 244 sq. ft. Model 2KS has a power loading of 11.40 lb. per hp., 1,981 empty weight, total rated hp. 285, at sea level, normal range 504 miles (all range figures with 15% reserve fuel), fuel consumption at cruising speed 17 gallons per hour. Seats 5.

PERFORMANCE High speed 144 miles per hour at sea level, cruising speed 135 miles per hour at an altitude of 6,000 to 10,000 ft., stalling speed 52 miles per hour, climb at sea level 750 ft. per minute, service ceiling 12,500 ft.

CONSTRUCTION MATERIAL Wing spars are of spruce, spruce ribs, fabric covering material, wheel size is 7.50 x 10, Hayes hydraulic brakes, Waco Oleo landing gear shock unit, wheel tail unit.

A. T. C. No. 626



WACO Model S

STANDARD EQUIPMENT This model is equipped with the following instruments: compass, tachometer, altimeter, air speed, oil pressure, oil temperature and gas gages and voltammeter, Lord instrument mountings. Approved for floats.

(For further specifications see table p. 109)

BEECH Model 18S

SPECIFICATIONS: Span 47 ft 6 in., overall length 34 ft. 3 in., height overall 9 ft. 5 in., landing gear tread 15-¾ in., wing loading 21.5 lb per sq. ft., power loading 8.3 lb per hp., weight empty 5,056 lb., gross weight 7,500 lb. The two P. & W. Wasp, Jr. engines are rated at 600 hp. at sea level, the fuel capacity is 210 gallons, normal range 1,100 miles, fuel consumption at cruising speed 43 gallons per hour, diameter of the propeller is 99 in., area of wing (including ailerons) 347 sq. ft., total aileron area 23.9 sq. ft., fin area 16.3 sq. ft., rudder area 17.3 sq. ft., stabilizer area 38.2 sq. ft., total elevator area 27.2 sq. ft. Seats 8 or 9.

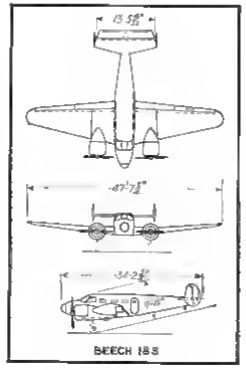
PERFORMANCE: High speed of 230 m.p.h. at sea level, cruising speed of 220 m.p.h., at altitude of 12,000 ft., stalling speed 61 m.p.h., climb at sea level 1,850 ft. per minute, service ceiling 21,000 ft.

CONSTRUCTION MATERIAL: Welded steel tubing wing spars, aluminum alloy ribs, aluminum alloy covering, fuselage is of aluminum alloy, retractable landing gear, Goodyear wheel, size 29 x 135, Goodyear hydraulic brakes, air oil shock unit, retractable wheel tail unit. Plexiglas cockpit enclosures and similar transparent sections.

(For further specifications see table p 109)

Landing Gear

A. T. C. No. 710



BEECH 18S

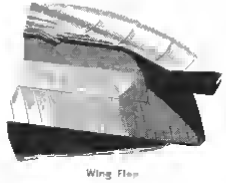
BOEING Model 307 B

SPECIFICATIONS: The span is 107 ft. 3 in., overall length 74 ft. 4 in., overall height 20 ft. 9½ in., wing loading 30.2 lb. per sq. ft., power loading 12.5 lb. per hp., empty weight 30,000, gross weight 45,000 lb., powered by four Wright Cyclone engines with total rated hp. 4,400 at sea level, fuel capacity 1,700 gallons, normal range 1,615 miles, fuel consumption at cruising speed 158 gallons per hour, diameter of propellers 138 in., wing area (including ailerons) 1,486 sq. ft. Seats 38.

PERFORMANCE: The high speed is 250 miles per hour at an altitude of 16,200 ft., cruising speed 222 miles per hour, at an altitude of 19,000 ft., stalling speed 70 miles per hour, climb at sea level 1,200 ft. per minute, service ceiling 24,000 ft.

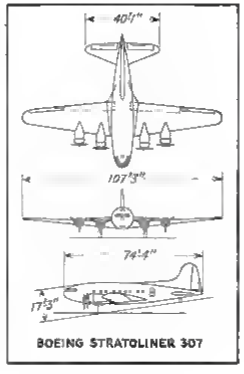
CONSTRUCTION MATERIAL: Plexiglas is used for cockpit enclosures and similar transparent sections.

(For further specifications see table p 109)



Wing Flap

A. T. C. No. 726



BOEING STRATOLINER 307

BOEING Model 314

SPECIFICATIONS: Span 152 feet, overall length 106 feet, overall height 27 feet 7 inches, wing loading 29.3 pounds per square foot, power loading 17.5 pounds per horse power, empty weight 48,545 lb. gross weight 84,000 pounds, powered by 4 Wright double row Cyclones, total rating of 6,000 horse power at sea level, fuel capacity 4,200 gallons, normal range 3,100 miles, diameter of propeller 168 inches, wing area including ailerons 2,867 square feet. Equipped with Lord instrument and engine mountings. Seats 89.

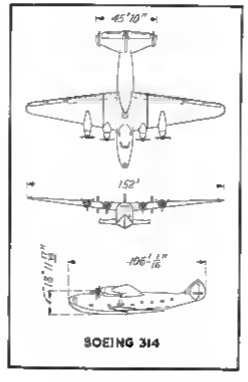
PERFORMANCE: High speed 190 miles per hour, cruising speed 175 miles per hour at an altitude of 10,000 feet, stalling speed 70 miles per hour, climb at sea level 600 feet per minute, service ceiling 14,000 feet.

CONSTRUCTION MATERIAL: Wing spars are of aluminum alloy and steel, ribs of aluminum alloy, covering material of Alclad. The fuselage is riveted Alclad. Plexiglas is used for cockpit enclosures, landing - light covers and similar transparent sections.

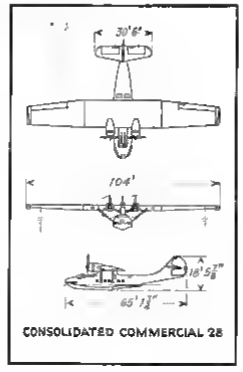
(For further specifications see table p 109)

Wing Spar Section

A. T. C. No. 704



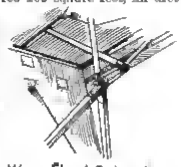
BOEING 314



CONSOLIDATED COMMERCIAL 28

SPECIFICATIONS: Span 104 feet, length overall 65 feet 2 inches, height overall 19 feet 9 inches. Wing loading 21.8 pounds per square foot, power loading 12.7 pounds per horsepower, gross weight 30,500 pounds. It is powered by two Pratt and Whitney Twin Wasp engines. Total rated horsepower 2,100 at an altitude of 7,500 feet. Normal range 2,200 miles. The area of wing (including ailerons) 1,400 square feet, total aileron area 100 square feet, fin area 60.8 square feet, rudder area 50 square feet, stabilizer area 119.8 square feet, total elevator area 85 square feet. Seats 17 to 24.

PERFORMANCE: High speed 198 miles per hour at an altitude of 7,500 feet, cruising speed



Wing Float Retracting Mechanism

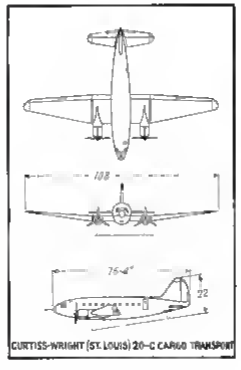
N. A. T. C.

CONSOLIDATED Commercial Model 28

185 miles per hour at an altitude of 10,000 feet, stalling speed 68 miles per hour, service ceiling 18,500 feet.

CONSTRUCTION MATERIAL: The wings have riveted aluminum alloy spars, aluminum alloy ribs, aluminum alloy and fabric covering material, aluminum alloy riveted monocoque hull.

(For further specifications see table p 109)



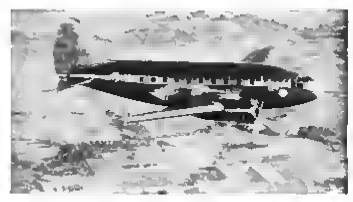
CURTISS-WRIGHT (ST. LOUIS) 20-C CARGO TRANSPORT

SPECIFICATIONS: Span 108 ft., overall length 70 ft. 4 in., overall height 22 ft., landing gear tread 311 in., wing loading 29.4 lb. per sq. ft., power loading 11.8 lb. per hp., weight empty 23,545 lb., gross weight 40,000 lb., powered by 2 Wright Cyclone double-row engines, total rated hp. 1,500 each at an altitude of 7,000 ft., fuel capacity 1,000 gallons, normal range 1,570 miles, fuel consumption at cruising speed 140 gallons per hour, diameter of propeller 180 in., wing area (including ailerons) 1,860 sq. ft., total aileron area 79.2 sq. ft., fin area 115.4 sq. ft., rudder area 52.8 sq. ft., stabilizer area 158.5 sq. ft., total elevator area 95.0 sq. ft.

PERFORMANCE: High speed 262 m.p.h. at an altitude of 13,000 ft., cruising speed 222 m.p.h. at an altitude of 10,000 ft., stalling speed 72 m.p.h., climb at sea level 1,500 ft. per minute, service ceiling 24,900 ft.

Flap Control

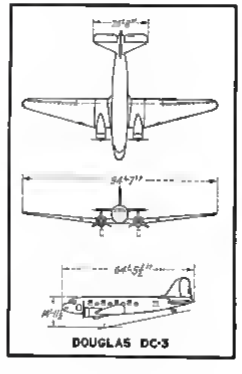
No. A. T. C.



CURTISS-WRIGHT (St. Louis) Model 20-C

CONSTRUCTION MATERIAL: Alclad wing spars, Alclad ribs, Alclad covering, retractable type of landing gear, wheel size 19 x 2.5, hydraulic brakes, Oleo pneumatic landing gear shock unit, Alclad fuselage.

(For further specifications see table p 109)



DOUGLAS DC-3

SPECIFICATIONS: Span 95 feet, length overall 64 feet 6 inches, height overall 16 feet 11 inches, landing gear tread 222 inches. Wing loading 25.5 pounds per square foot, power loading 10.5 pounds per hp., weight empty 16,600 pounds, gross weight 25,200 pounds. It is powered by 2 Wright Cyclone engines. Total rated hp. 2,000 at 6,900 feet. Fuel capacity 822 gallons, normal range 2,125 miles. Fuel consumption at cruising speed 104 gallons per hour. Propeller diameter 138 inches. Wing area (including ailerons) 987 square feet, aileron area (total) 102.8 square feet, fin area 47.1 square feet, rudder area 46.3 square feet, stabilizer area 128 square feet, total elevator area 82.3 square feet.

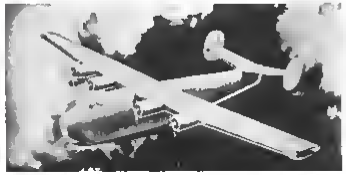
PERFORMANCE: High speed 220 miles per hour at 7,900 feet, cruising speed 194 miles per hour at 11,200 feet, stalling speed 67 miles per hour. Climb at sea level 1,070 feet per minute, service ceiling 21,900 feet.

A. T. C. No. 618

DOUGLAS Model No. DC-3

CONSTRUCTION MATERIAL: Wings have Alclad spars, Alclad ribs, and Alclad covering material. The model has retractable type landing gear, Bendix 45 x 17-16 wheels, Bendix hydraulic brakes, Bendix Oleo pneumatic landing gear shock unit, wheel tail unit, and Alclad riveted fuselage. Seats 21.

(For further specifications see table p 109)

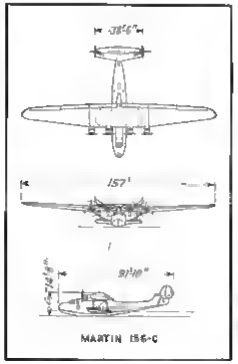


CONSOLIDATED Model 29 No A. T. C. Number

SPECIFICATIONS Span 115 ft. overall length 70 ft. 3 in., overall height 25 ft. 4 in. wing loading 36.5 lb. per sq. ft. power loading 15.6 lb. per hp. gross weight 65,000 lb., powered by four P. & W. Twin Wasp engines, with total rated hp. 4,200 at an altitude of 7,500 ft. normal range 3,700 miles. area of wing (including ailerons) 1,780 sq. ft.

PERFORMANCE High speed 226 m.p.h. at an altitude of 7,500 ft., cruising speed 209 m.p.h.

(For further specifications see table p. 186)



GLENN L. MARTIN Model No. 156-C

CONSOLIDATED Model 32

DOUGLAS Model DC-4

SPECIFICATIONS Span 117 ft. 6 in. overall length 93 ft. 10 in. overall height 27 ft. 9 in. tire landing gear tread is 286 in. wing loading 35.6 lb. per sq. ft. power loading 10 lb. per hp., weight empty 24,425, gross weight 52,000 lb. powered by four Pratt & Whitney engines with a total rated hp. of 4,400 at an altitude of 6,200 ft. fuel capacity 1,700 gallons. normal range 2,540 miles fuel consumption at cruising speed 221 gallons per hour propeller diameter 156 in.

Wing area (including ailerons) 1,462 sq. ft. total aileron area 120.4 sq. ft., fin area 72.5 sq. ft., rudder area 63.4 sq. ft., stabilizer area 219 sq. ft, total elevator area 118.6 sq. ft.

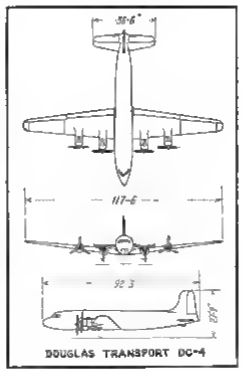
PERFORMANCE High speed 265 miles per hour at an altitude of 16,900 ft., cruising speed 182 miles per hour at an altitude of 15,700 ft. stalling speed 78 miles per hour, climb at sea level 1,550 ft. per minute, service ceiling 26,600 ft.

CONSTRUCTION MATERIAL Alclad wing spars. Alclad ribs, Alclad covering. Plexiglas is used for cockpit enclosures and similar transparent sections. The landing gear is of retractable tricycle type wheel are 42 x 16.50 16, wheel type Goodyear Goodyear hydraulic brakes, Bendix Oleo pneumatic landing gear shock unit fuselage riveted Alclad

(For further specifications see table p. 189)

Nose Wheel

No. A. T. C. Number



GRUMMAN G-21A

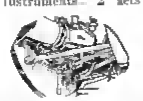
SPECIFICATIONS Span 49 ft. overall length 38 ft. 4 in. height overall 12 ft. landing gear tread 90⅝ in. wing loading 21.3 lb. per sq. ft. power loading 8.0 lb. per hp. weight empty 5,475 lb. gross weight 8,000 lb. This model is equipped with two P. & W. Wasp Jr. engines rated at 800 hp. at an altitude of 5,000 ft. fuel capacity is 220 gallons, normal range 1,000 miles, fuel consumption at cruising speed 51 gallons per hour, diameter of the propeller 102 in., area of wing (including ailerons) 275 sq. ft., total aileron area 22.5 sq. ft., fin area 20.7 sq. ft. rudder area 21 sq. ft., stabilizer area 44.8 sq. ft., total elevator area, 21.2 sq. ft.

PERFORMANCE High speed of 201 m.p.h. at an altitude of 5,000 ft. cruising speed 190 m.p.h. at an altitude of 9,600. stalling speed 62 m.p.h. climb at sea level 1,300 ft. per m. service ceiling 22,000 ft.

CONSTRUCTION MATERIAL Aluminum alloy box wing spars aluminum alloy ribs, metal covering fuselage is of aluminum alloy monocoque type. Plexiglas is used for cockpit enclosures and similar transparent sections.

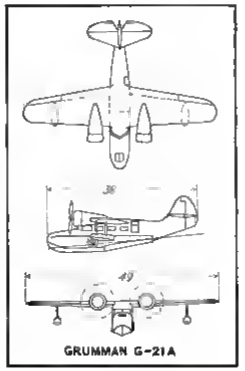
STANDARD EQUIPMENT includes the following instruments. 2 sets of engine instruments standard set flight instruments accessories include Lord shock mountings Goodrich tires Hayes brakes, Hamilton propeller Bendix shock struts, Adams Westlake and Grimes lights.

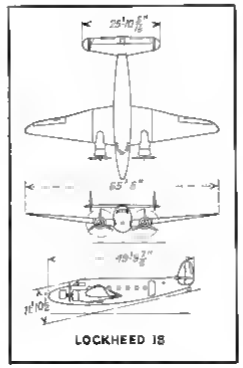
(For further specifications see table p. 190)



Engine Mount and Oil Cooler

A. T. C. No. 654





SPECIFICATIONS The Model 18 is available with P. & W. or Wright engines of different ratings. Dimensions of model 18-10 are: span 65 ft. 6 in., overall length 49 ft. 9¾ in. overall height 11 ft. 10½ in.; the landing gear tread 184 in. wing loading 33.50 lb. per sq. ft., power loading 8.89 lb. per hp., weight empty 12,208 lb., gross weight 8,500 lb. When powered by two Pratt & Whitney Twin Wasp engines it is rated at 2,100 hp. at an altitude of 7,500 ft. Fuel capacity is 644 gallons, normal range 1,540 miles, fuel consumption at cruising speed 95 gallons per hour.

PERFORMANCE High speed 248 m.p.h. at an altitude of 8,800 ft., cruising speed 239 mph at an altitude of 15,000 ft. Stalling speed 70 m.p.h. climb at sea level 1,850 ft. per minute, service ceiling 23,500 ft.

CONSTRUCTION MATERIAL Wing spars are of Alclad and Russ, ribs and covering material

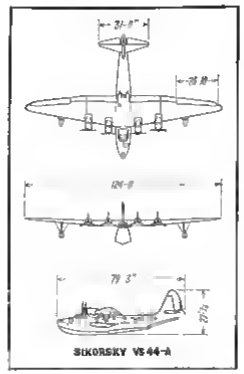
Tail Wheel

A. T. C. No. 723

LOCKHEED Model 18

...rr of Alclad. Plexiglas is used for cockpit enclosures and similar transparent sections. The monocoque fuselage is of Alclad and Russco. The landing gear is of retractable type. Wheels are Goodyear and measure 41.31 x 15.0. Goodyear hydraulic brakes. This model is also equipped with Aerol landing gear shock unit and wheel tail unit

(For further specifications see p. 189)



SPECIFICATIONS Dimensions of this model are: 124 ft. span overall length 79 ft. 3 in. overall height 27 ft. 7¾ in. Wing loading weight 34.4 lb. per sq. ft. power loading 13.1 lb. per hp. weight empty 30,200 lb., gross weight 67,500 lb. It is powered by four Pratt & Whitney Hornets totaled rated horse power of 4,200 at an altitude of 7,500 ft. The fuel capacity is 3,900 gallons and has a normal range of 3,800 miles. The propellers measure 150 inches in diameter. The wing area including ailerons is 1,670 square feet. The Model S-43 B, an earlier design—see photo and 3 view below—is powered by 2 Pratt & Whitney Wasp engines, has a total rated hp. of 1,500 at an altitude of 7,000 ft. The fuel capacity is 400 gallons normal range 770 miles, diameter of propeller 138 in. Wing area (including ailerons) 780.6 sq. ft., total aileron 53.2 sq. ft., fin 26.8 sq. ft., rudder 30.74 sq. ft., stabilizer 86.4 sq. ft., total elevators 58.47 sq. ft. The S-43 B wings have aluminum alloy box spar, aluminum alloy ribs, aluminum alloy fabric covering material

PERFORMANCE The VS-44 A has a cruising speed of 175 miles per hour at an altitude of

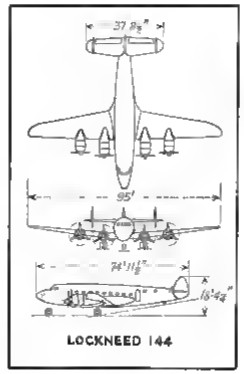
No. A. T. C.

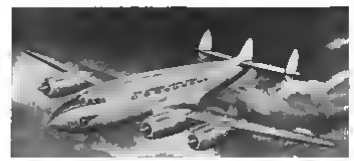
VOUGHT-SIKORSKY Model VS-44 A

7,500 ft. Its stalling speed is 65 m.p.h. Climb at sea level 600 ft. per minute. Service ceiling 17,600 ft.

CONSTRUCTION MATERIAL The VS-44 A wing spar is made of aluminum alloy, truss type, aluminum alloy ribs and covered with aluminum alloy and fabric.

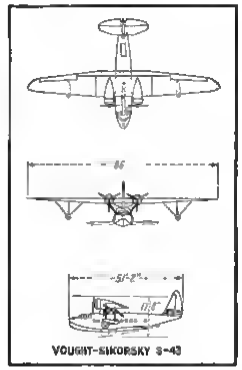
(For further specifications see p. 189)





LOCKHEED Model 144 No. A.T.C.

VOUGHT SIKORSKY Model S-43 A.T.C. No. 593



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. . . with all seats occupied

. . . in a Fairchild "24"

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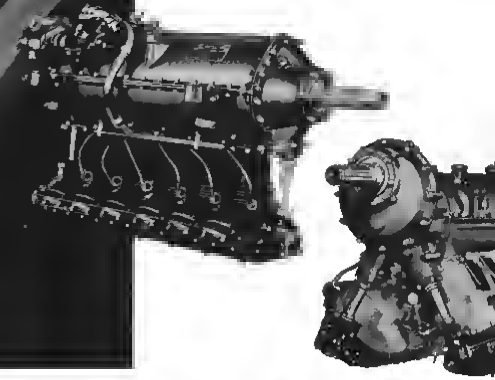

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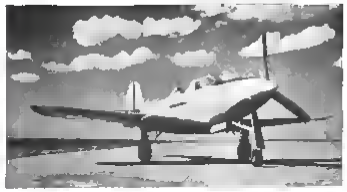


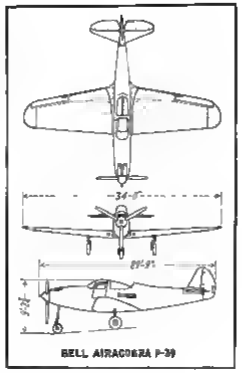
BELL Model P-39 Airacobra

SPECIFICATIONS Span 34 ft, length overall 29 ft 9 in, height overall 9 ft 2.75 in., landing gear tread 136 inches, wing loading 31.03 lb per square foot, power loading 6.07 lb per horse power, weight empty 4,955, gross weight 6,662, powered by an Allison engine, total rated horse power 1,090 at an altitude of 15,000 feet, fuel capacity 140 gallons, normal range 1,560 miles fuel consumption at cruising speed 56.6 gallons per hour, diameter of propeller 124.5 in., wing area (including allerons) 213 sq. ft., total aileron area 15.94 sq. ft., fin area 9.81 sq. ft., rudder area 10.22 sq. ft., stabilizer area 24.22 sq. ft., total elevator area 17.34 sq. ft.

CONSTRUCTION MATERIAL The wings have metal spars, metal ribs stressed skin covering material, retractable tricycle type of landing gear, wheel size 26 inches x 6 inches hydraulic brakes Oleo landing gear shock unit, monocoque fuselage

(For further specifications see table p 115)

Nose Wheel



BELL AIRACOBRA P-39

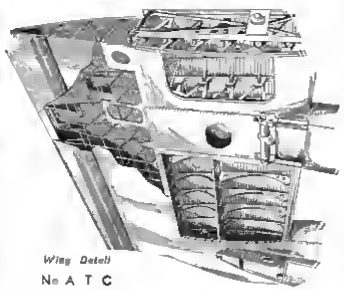
BOEING Model B-299 T, Flying Fortress

SPECIFICATIONS The span is 103 feet 9⅝ inches, length overall 67 feet 10⅞ inches height overall 15 feet 4¼ inches wing loading 33.5 pounds per square foot power loading 11.88 lb per horsepower, weight empty 31,160 pounds gross weight 47,500 pounds It is powered by 4 Wright Cyclone engines total rated horse power 4,800 at sea level fuel capacity 3,100 gallons, normal range over 3,000 miles diameter of propeller 138 inches

PERFORMANCE High speed 325 miles per hour stalling speed 70 miles per hour, climb at sea level 2,260 feet per minute service ceiling 36,700 feet.

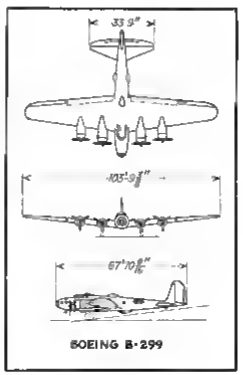
CONSTRUCTION MATERIAL Aluminum alloy wing spars, aluminum alloy ribs, Alclad covering material retractable type of landing gear, Oleo pneumatic landing gear shock unit, retractable wheel tail unit, riveted aluminum alloy Alclad fuselage

(For further specifications see table p 115)

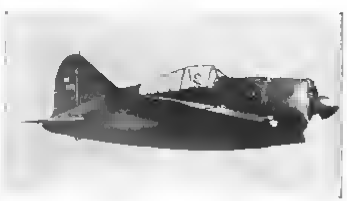


Wing Detail

No A T C



BOEING B-299



BREWSTER Model No 339

SPECIFICATIONS Span 35 ft., length overall 25 ft. 5⅝ in., overall height 12 ft. It is powered by a Wright Cyclone engine rated at 800 hp. Fuel capacity 100 gallons the propeller measures 123 in. in diameter

CONSTRUCTION MATERIAL Wing spars are of steel single metal box spar aluminum truss ribs aluminum covering retractable type landing gear streamlined wheels 27 in hydraulic brakes Oleo pneumatic landing gear shock unit, monocoque fuselage.

STANDARD EQUIPMENT Kollsman, Sperry, Pioneer Elgin, Weld & Kiddy instruments, Bendix shock mountings, General tires, Hayes brakes, Curtiss propeller Bendix seats Arcan controls, Torrington bearings Oleo shock strut, Mazda lights Radio Model G F series.

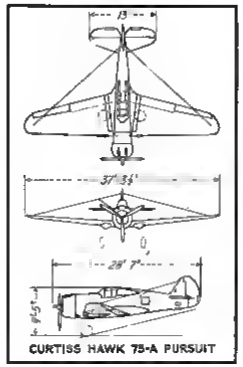
CONSOLIDATED Model 28—Military Amphibian

SPECIFICATIONS Span 104 feet, length overall 65 feet 2 inches, height overall 19 feet 9 inches, landing gear tread 16 feet 7 inches, wing loading 22.8 pounds per square foot, power loading 13.3 pounds per horse power, gross weight 32,000 pounds, powered by 2 Pratt & Whitney Twin Wasp engines, total rated horse power 2,100 at an altitude of 7,500 feet, normal range 3,300 miles, wing area (including allerons) 1,400 square feet, total aileron area 100 square feet, fin area 60.8 square feet, rudder area 50 square feet stabilizer area 110.8 square feet, total elevator area 85 square feet

PERFORMANCE High speed 196 miles per hour at an altitude of 7,500 feet, cruising speed 183 miles per hour, at an altitude of 10,000 feet, stalling speed 68 miles per hour, service ceiling 17,000 feet.

CONSTRUCTION MATERIAL Aluminum alloy riveted wing spars, aluminum alloy ribs, aluminum alloy fabric covering Retractable type of landing gear, wheels are of smooth contour type size 47 inches, hydraulic brakes Oleo landing gear shock unit, aluminum alloy, riveted monocoque fuselage

(For further specifications see table p 115)



CURTISS HAWK 75-A PURSUIT

SPECIFICATIONS Span is 37.3 feet, length overall 28.8 feet, height overall 9.5 feet. Wing loading 24.3 pounds per square foot, power loading 4.8 pounds per horsepower empty weight 4,541 pounds, gross weight 5,731 pounds. It is powered by a Wright engine, total rated horsepower 1,000 at an altitude of 15,000 feet Fuel capacity 163 gallons, normal range 1,003 miles. Wing area (including allerons) 236 square feet. Fin area 7 square feet rudder area 13.7 square feet, stabilizer area 28.8 square feet total elevator area 19.2 square feet.

PERFORMANCE High Speed 323 miles per hour at an altitude of 15,000 feet, cruising speed 262 miles per hour at an altitude of 15,000 feet Stalling speed 69 miles per hour Service ceiling 32,700 feet. The earlier Hawk 75 with fixed type landing gear, had the following performance figures: High speed 250 miles per hour at an altitude of 10,700 feet; cruising speed 240 miles per hour at an altitude of 10,700 feet Rate of climb 2,340 feet per minute; cruising range of 1,210-1,380 miles.

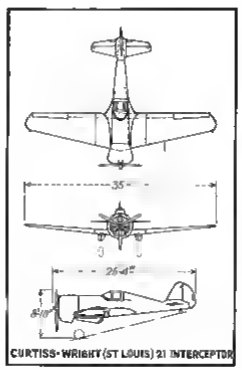
CONSTRUCTION MATERIAL Wing spars and ribs of the later model 75-A are of metal Alclad covering material It is equipped with a retractable type landing gear hydraulic brakes Curtiss Oleo landing gear shock unit, wheel type tail unit Alclad monocoque fuselage. This model is a low wing angle seat, all metal par

CURTISS HAWK 75 A No A T C.

suit monoplane and is available for domestic or export market.

STANDARD EQUIPMENT The Model 75-A is equipped with Curtiss Inconel exhaust manifold, Oleo shock absorbers, battery, landing lights, Pyrene or Kidde fire extinguishers three double navigation lights flares, radio shielding and bonding Eclipse cartridge type or Inertia starter Bendix wheels and hydraulic brakes, Curtiss electric propeller and Lord instrument panel and engine mountings.

(For further specifications see table p 115)



CURTISS-WRIGHT (ST LOUIS) 21 INTERCEPTOR

SPECIFICATIONS Span 35 ft., length overall 26 ft 4 in. height overall 8 ft 8 in landing gear tread 107 in. wing loading 25.8 lb per sq. ft., power loading 4.5 lb per hp., weight empty 3,382 lb. gross weight 4,500 lb It is powered by a Wright Cyclone engine Total rated hp. 800 at 18,000 ft., and 1,000 at 5,600 ft., fuel capacity 100 gal., normal range 630 mi. fuel consumption at cruising speed 44.7 gal. per hr. propeller diameter 102 in., wing area (including allerons) 174.3 sq. ft., aileron area (total) 11.90 sq. ft., fin area 3.06 sq. ft., rudder area 7.36 sq. ft., stabilizer area 16.98 sq. ft., total elevator area 8.58 sq. ft.

PERFORMANCE High speed 333 m p h at 18,000 ft., and 314 m p h at 5,600 ft., cruising speed 282 m p h. at 12,200 ft., stalling speed 68 m p h, climb at sea level 4,350 ft per min., service ceiling 34,300 ft

CONSTRUCTION MATERIAL Wings have Alclad spars Alclad ribs, Alclad covering material, retractable type landing gear, Goodyear wheel 27 in, Goodyear hydraulic brakes, Oleo-pneu-

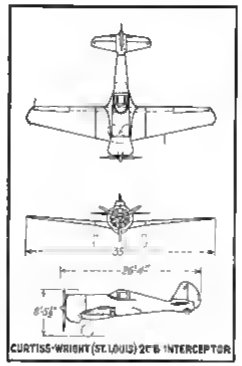
Landing gear

CURTISS-WRIGHT (St Louis) Model No 21 B Interceptor

matic landing gear and shock unit wheel tail unit, aluminum alloy, riveted Alclad fuselage

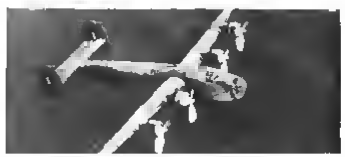
STANDARD EQUIPMENT Instruments Kollsman rate of climb Kollsman compass, Kollsman tachometer Kollsman eng gage Kollsman air speed indicator Kollsman altimeter Pioneer bank and turn Kollsman manifold press, Wes tco cyl temp Radio R C A transmitter and R C A. receiver

(For further specifications see table p 115)

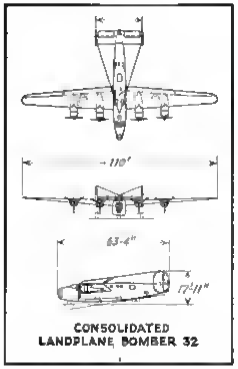


CURTISS-WRIGHT (ST. LOUIS) 2C-6 INTERCEPTOR

CURTISS-WRIGHT (St Louis) Model No. 21



CONSOLIDATED Model 32



CONSOLIDATED LANDPLANE BOMBER 32

CURTISS Model HAWK 81-A

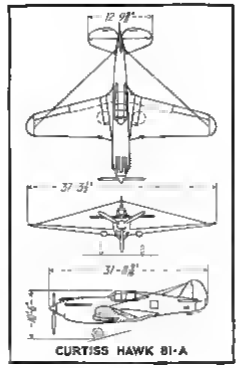
SPECIFICATIONS: Span 37.3 feet, length overall 31.7 feet, height overall 10.6 feet, wing loading 29.6 pounds per square foot, power loading 6.4 pounds per horsepower, weight empty 5,475 pounds, gross weight 6,978 pounds. This model is powered by an Allison engine. The total rated horsepower is 1,090 at an altitude of 15,000 feet. Fuel capacity is 160 gallons.

Gun Installation

normal range 803 miles. The wing area (including ailerons) is 236 square feet, fin area 7.6 square feet, rudder area 13.7 square feet, stabilizer area 28.8 square feet, and area of total elevators is 19.2 square feet.

CONSTRUCTION MATERIAL: The wing spars of this model are constructed of metal, the ribs are of metal, and it has Alclad covering material. It is equipped with a retractable type landing gear, hydraulic brakes, Curtiss-Oleo landing gear shock unit, wheel tail unit, and monocoque type Alclad fuselage.

(For further specifications see p. 115)



CURTISS HAWK 81-A

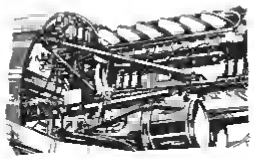
CURTISS Model P-40

SPECIFICATIONS: The span of this model is 37.3 feet, length overall 31.7 feet, height overall 10.6 feet. Wing loading 28.6 pounds per square feet, power loading 6.6 pounds per horsepower, weight empty 5,381 pounds, gross weight 8,789 pounds. This model is powered by an Allison engine. The total rated horsepower is 1,000 at 16,000 feet. Fuel capacity 120 gallons.

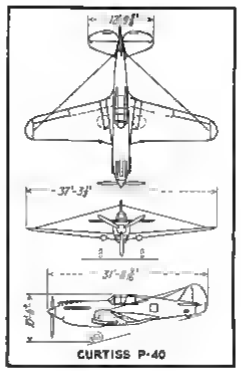
normal range 945 miles. The wing area (including ailerons) is 236 square feet, fin area 7.0 square feet, rudder area 13.7 square feet, stabilizer area 28.8 square feet, area of total elevators 19.2 square feet.

CONSTRUCTION MATERIAL: The wings of this model have spars made of metal, ribs made of metal and the covering material is of Alclad. It is equipped with a retractable type landing gear, hydraulic brakes, Curtiss-Oleo landing gear shock unit, wheel tail unit and it has a monocoque type fuselage constructed of Alclad.

(For further specifications see p. 115)



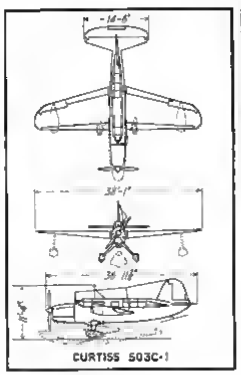
Engine Mount



CURTISS P-40

CURTISS-WRIGHT (Buffalo) SO3C-1

SPECIFICATIONS: Span 38 feet, length overall 36 ft. 9 in., height overall 15 ft. Wing loading 19.7 pounds per square foot, power loading 12.7 pounds per square foot, weight empty 4284 pounds, gross weight 5729 pounds. This model is powered by a Ranger inverted engine total rated horsepower 520. Fuel capacity 100 gallons. Wing area (including ailerons) 290 square feet, fin area 13.0 square feet, rudder area 13.1 sq. ft.



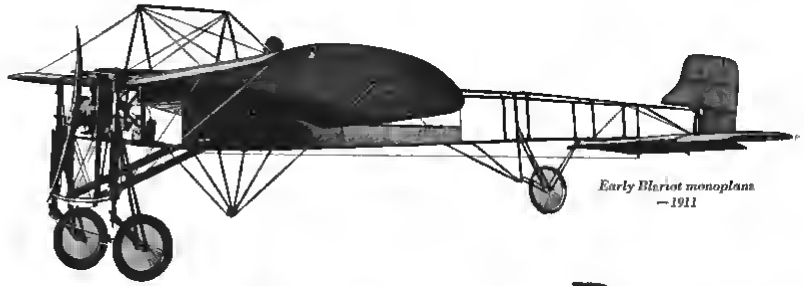
CURTISS SO3C-1

BREWSTER Model 340

SPECIFICATIONS: Span 47 ft. overall length 39½ ft. height overall 15¼ ft. It is powered by a Wright Cyclone engine of 1500 hp.

STANDARD EQUIPMENT: Kollsman Sperry, Pioneer, Elgin, Weld & Kiddy Asco instruments, Bendix shock mountings, General tires, Hayes brakes Curtiss propeller Bendix seats, Arens controls, Torrington bearings Oleo shock strut, Mazda lights. Radio: Model G F series

(For further specifications see p. 115)



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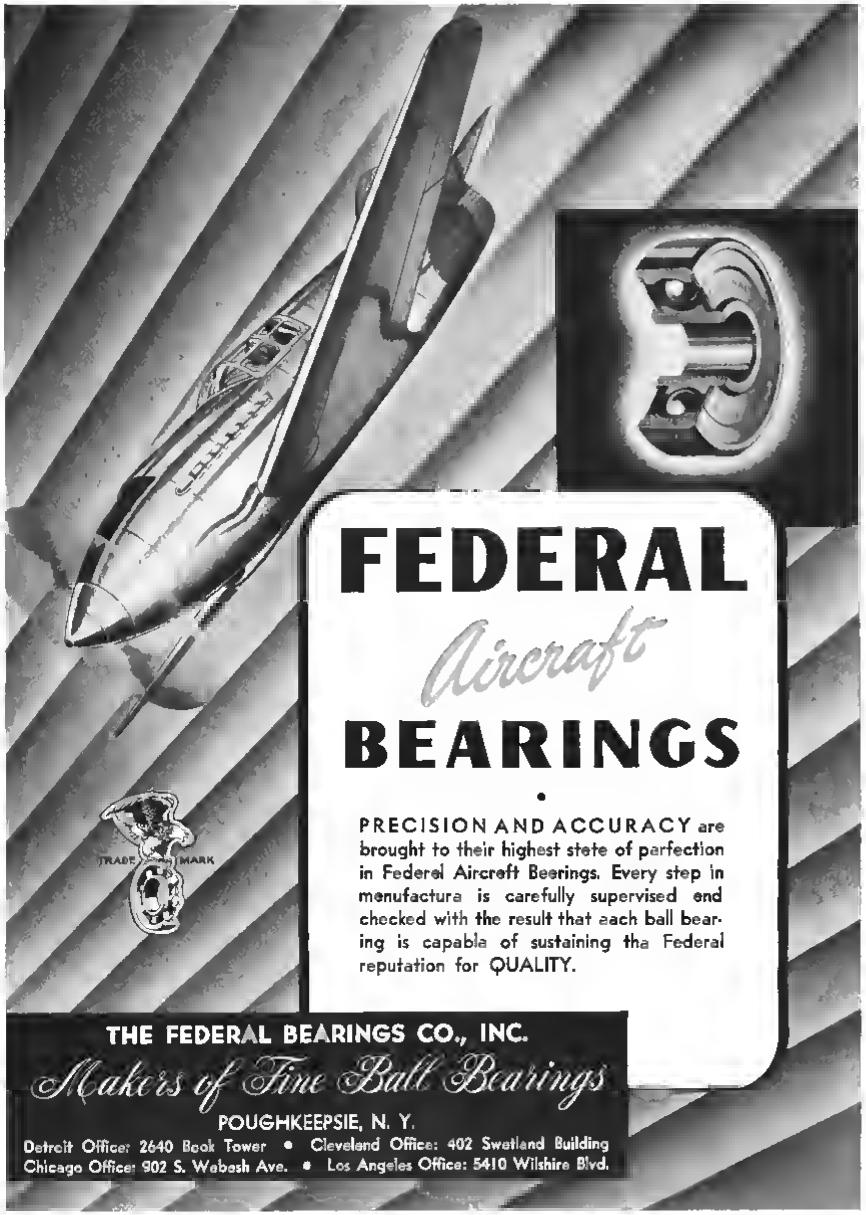

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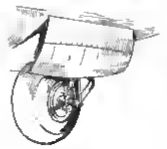
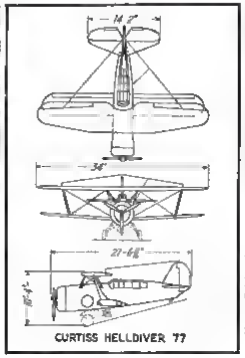
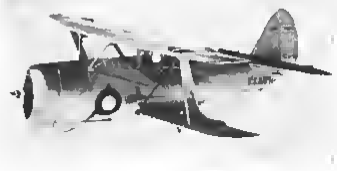
DOUGLAS B-23



Landing Gear



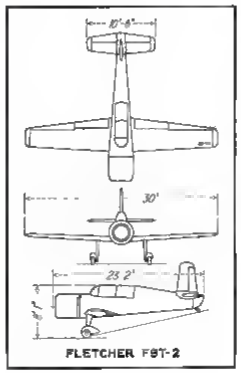
CURTISS HELLDIVER 77



CURTISS Model Helldiver 77

SPECIFICATIONS Span 34 feet, overall length 27 feet 5 inches, overall height 10 feet 4 inches, wing loading 19.7 pounds per square foot, power loading 6.6 pounds per horse power, weight empty 4 548, gross weight 6 236 pounds, powered by a two-row Wright Cyclone engine, total rated horse power 950 at an altitude of 15,200 feet, fuel capacity 135 gallons, range 355 miles

(For further specifications see p 115)



FLETCHER FST-2

SPECIFICATIONS Span 30 feet, overall length 23 2 feet, overall height 8 1 feet. The landing gear tread is 101 inches, wing loading 20.0 pounds per square foot, power loading 8.75 pounds per horsepower, weight empty 1,740 gross weight 2,500 pounds. It is powered by a Wright engine, with total rated horsepower 285 at sea level, fuel capacity 50 gallons, normal range 540 miles, fuel consumption at cruising speed 14 gallons per hour, diameter of propeller 7 feet 10 inches, wing area (including ailerons) 125 square feet, total area of ailerons 11.4 square feet, fin area 8.9 square feet, rudder area 4.1 square feet, stabilizer area 17.8 square feet, area of total elevators 8.2 square feet. Seats two

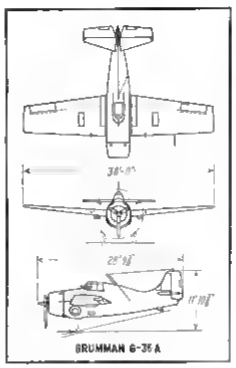
PERFORMANCE High speed 175 miles per hour at sea level, cruising speed 150 miles per hour at sea level, stalling speed 60 miles per hour, climb at sea level 1 340 feet per minute, service ceiling 19 000 feet.

Cockpit Enclosure

FLETCHER Model FST 2

CONSTRUCTION MATERIAL Spruce wing spars, spruce ribs, plywood covering. It is equipped with fixed type of landing gear, Firestone wheels 8.00 x 6, Firestone hydraulic brakes, air and Oleo landing gear shock unit, wheel tail unit monocoque plywood fuselage

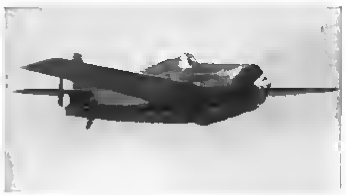
(For further specifications see p 115)



GRUMMAN G-36A

SPECIFICATIONS Span 38 ft., overall length 28 ft 10 in., overall height 9 ft. 2½ in. It is powered by a Wright Cyclone engine. Total rated hp. 1,200 at take-off. Wing area (including ailerons) 290 sq. ft., aileron area (total) 11.48 sq. ft., fin area 13.2 sq. ft. rudder area 9.88 sq. ft., stabilizer area 20.43 sq. ft., total elevator area 18.9 sq. ft. In addition to this and the model JRF 2 military amphibian Grumman builds a military amphibian model G21B whose specifications are, span 49 ft., overall length 38 ft. 4 in. overall height 12 ft., landing gear tread 90¾ in. Wing loading 21.3 lb. per sq. ft. power loading 8.9 lb. per hp., weight empty 5 425 lb., gross weight 8 000 lb. It is powered by 2 Pratt & Whitney Wasp Jrs., total rated hp. 800 at 5 000 ft. Fuel capacity 220 gallons, normal range 800 miles. Propeller diameter 102 in. Wing area (including ailerons) 375 sq. ft., aileron area (total) 22.8 sq. ft., fin area 26.7 sq. ft., rudder area 21 sq. ft. stabilizer area 44.8 sq. ft., total elevator area 31.2 sq. ft.

CONSTRUCTION MATERIAL: Wings of the G 36A have aluminum alloy spars, aluminum alloy ribs, metal covering. Retractable landing gear, 26 x 6 wheel, hydraulic brakes Bendix Oleo landing gear and shock unit, wheel tail unit, aluminum alloy monocoque fuselage



GRUMMAN Model No G-36A

STANDARD EQUIPMENT Complete set of flight and engine instruments. Lord shock mountings, Goodrich tires, Hayes brakes, Hamilton Hydromatic propeller, Bendix seats, Bendix shock strut, Grimes lights. Provision is made for a two-way radio

(For further specifications see p 115)

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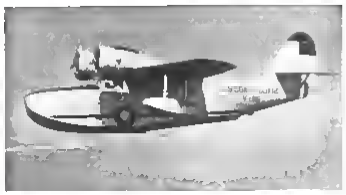


GRUMMAN Model No. JRF-2

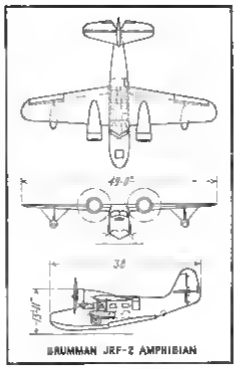
SPECIFICATIONS: Span 49 ft., length overall 38 ft. 4 in., height overall 12 ft., landing gear tread 00⅝ in., wing loading 21.3 lb. per sq. ft., power loading 8.0 lb. per hp., weight empty 5,530 lb., gross weight 7,955 lb. It is powered by a P. & W. Wasp Jr. T6D1 rated hp. 800 at 5,000 feet, fuel capacity 220 gal., normal range 1,000 mi., propeller diameter 102 in., wing area (including ailerons) 375 sq. ft., aileron area (total) 22.5 sq. ft., fin area 26.3 sq. ft., rudder area 21 sq. ft., stabilizer area 44.8 sq. ft., total elevator area 31.2 sq. ft. Instruments have Lord mountings. Seats eight.

PERFORMANCE: High speed 200 m.p.h. at 5,000 ft., cruising speed 190 m.p.h. at 9,600 ft., stalling speed 85 m.p.h., climb at sea level 1,300 ft. per min., service ceiling 22,000 ft.

CONSTRUCTION MATERIAL: Wings have aluminum alloy box spars, aluminum alloy ribs, metal covering material, retractable type landing gear, Hayes wheel 30 x 7, Hayes hydraulic brakes. Bendix Oleo landing gear and shock unit, wheel tail unit, aluminum alloy monocoque fuselage.

(For further specifications see table p. 115)

Wing Float



GRUMMAN JRF-2 AMPHIBIAN

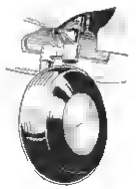
GLENN L. MARTIN Model 167 W

SPECIFICATIONS: Span 61 ft. 4 in., overall length 46 ft. 8 in., overall height 10 ft., landing gear tread 195 in., wing loading 28.4 lb. per sq. ft., power loading 8.5 lb. per hp., weight empty 10,586, gross weight 15,297 lb., powered by 2 Pratt & Whitney Twin Wasp engines, total rated hp. 2,100 at an altitude of 7,100 ft., fuel capacity 760 gallons, normal range 2,410 miles, diameter of propeller 132 in., wing area (including ailerons) 538.5 sq. ft., total aileron area 47.5 sq. ft., fin area 18.87 sq. ft., rudder area 23.89 sq. ft., stabilizer area 73.56 sq. ft., total elevator area 42.6 sq. ft. Seats three.

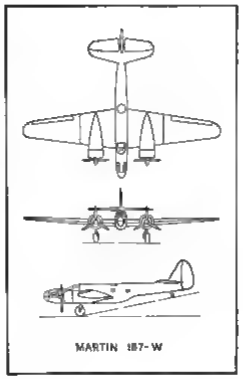
PERFORMANCE: High speed 310 miles per hour at an altitude of 14,000 feet, cruising speed 248 miles per hour, stalling speed 69 miles per hour, climb at sea level 1,790 feet per minute, service ceiling 31,500 feet.

CONSTRUCTION MATERIAL: Aluminum alloy wing spars, aluminum alloy ribs, aluminum alloy covering material, retractable type of landing gear, wheel size 30 in., smooth contour, hydraulic brakes, Oleo landing gear shock unit, wheel tail unit, aluminum alloy riveted fuselage.

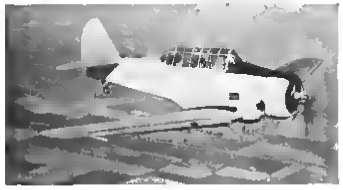
(For further specifications see table p. 115)



Landing Gear



MARTIN 187-W



NORTH AMERICAN Model NA-16-3

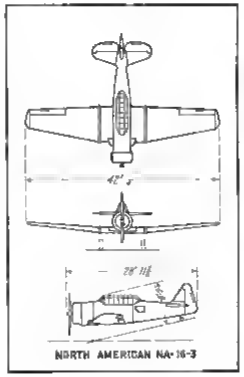
SPECIFICATIONS: Span 42 feet 1¼ inch, length overall 28 ft. 11¾ in., height overall 8 ft. 9 in., landing gear tread 115½ inches. Wing loading 20.73 pounds per square foot, power loading 9.56 pounds per horse power, weight empty 3,958 pounds, gross weight 5,260 pounds. It is powered by a Pratt & Whitney Wasp engine. Total rated horse power 550 at 5,000 feet, fuel capacity 111 gallons, normal range 730 miles, fuel consumption at cruising speed 23.5 gallons per hour, propeller diameter 108 inches. Wing area (including ailerons) 253.73 square feet, aileron area (total) 22.80 square feet, fin area 5.33 square feet, rudder area 13.21 square feet, stabilizer area 28.34 square feet, total elevator area 21.76 square feet. Seats two.

PERFORMANCE: High speed 206 miles per hour at 5,000 feet, cruising speed 180 miles per hour at 12,000 feet, stalling speed 66 miles per hour, climbs at sea level 1,350 feet per minute, service ceiling 23,000 feet.

CONSTRUCTION MATERIAL: Wings have aluminum alloy spars, aluminum alloy ribs, Alclad covering material. Retractable landing gear, 27 inch steel closed wheel, hydraulic brakes, Aerol landing gear shock unit, wheel tail unit.

(For further specifications see table p. 115)

Turnover Bulkhead



NORTH AMERICAN NA-16-3

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NORTH AMERICAN Model NA-40A

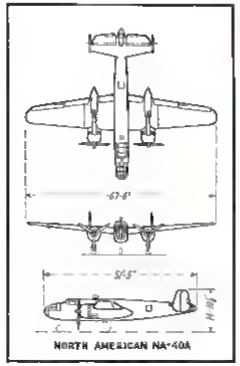
SPECIFICATIONS Span 67 ft. 6 in., overall length 51 ft. 5 in., overall height 14 ft. 10½ in., landing gear tread 232 in., wing loading 39.33 lb. per sq. ft., power loading 7.50 lb. per hp., weight empty 16,000, gross weight 24,000 lb., powered by 2 Wright Cyclone engines with total rated hp. 2,500 at an altitude of 12,000 ft., fuel capacity 910 gallons, normal range 1,728 miles, fuel consumption at cruising speed 133 gallons per hour, diameter of propeller 150 in., wing area (including ailerons) 610.1 sq. ft., total aileron area 32.3 sq. ft., fin area 40.8 sq. ft., rudder area 35.6 sq. ft., stabilizer area 92 sq. ft., total elevators 46 sq. ft. Seats five.

PERFORMANCE High speed 308 m.p.h. at an altitude of 13,000 ft., cruising speed 259 m.p.h. at an altitude of 10,500 ft., stalling speed 85 m.p.h., climb at sea level 1,880 ft. per minute, service ceiling 25,400 ft.

CONSTRUCTION MATERIAL Aluminum alloy wing spars, aluminum alloy ribs, Alclad covering material, 47 in. wheels, retractable tricycle type landing gear, emergency tail skid by-draulic brakes, mono coque Alclad fuselage.

(For further specifications see table p. 115)

Nose Wheel



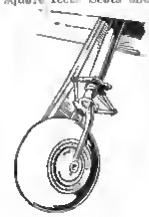
NORTH AMERICAN NA-40A

NORTH AMERICAN Model NA-73

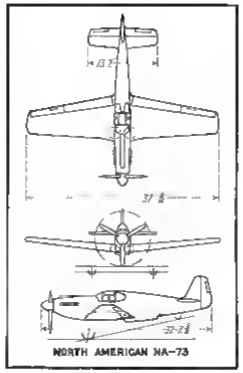
SPECIFICATIONS Span is 37 feet 4⅛ inches, overall length 32 feet 2⅛ inches, overall height 104 inches, the landing gear tread 141 inches, wing loading 32.6 pounds per square foot power loading 7.34 pounds per horse power, weight empty 5,990 pounds, gross weight 7,708 lt is powered by an Allison engine, total rated horse power 960 at an altitude of 12,000 feet. Fuel capacity 105 gallons, normal range 640 miles, fuel consumption at cruising speed 48.8 gallons per hour. The propeller measures 126 inches in diameter. Wing area (including ailerons) 235.95 square feet total aileron area 16.6 square feet, fin area 10.07 square feet, rudder area 10.80 square feet stabilizer area 28.04 square feet, total elevator area 16.46 square feet. Seats one.

CONSTRUCTION MATERIAL Aluminum alloy wing spars and ribs covering material of Alclad The landing gear is of retractable type, wheels are 27 inches of steel closed type, hydraulic brakes Aerol landing gear shock unit, Alclad mono coque fuselage.

(For further specifications see table p. 115)



Landing Gear



NORTH AMERICAN NA-73

NORTHROP Model N-3PB

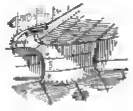
SPECIFICATIONS Span 48 feet 11 inches, overall length 38 feet, overall height 16 feet 10 inches, landing gear tread 11 feet 2 inches, wing loading 22½ pounds per square foot, power loading 8.05 pounds per horse power, weight empty 6,151 pounds, gross weight 8,500 pounds powered by a Wright G-200 engine, total rated horse power 1,200 at sea level fuel capacity 320 gallons normal range 1,165 miles, fuel consumption at cruising speed 38½ gallons per hour, diameter of propeller 126 inches, wing area (including ailerons) 377 square feet, total aileron area 24 square feet, fin area 12.7 square feet rudder area 25.4 square feet, stabilizer area 35.6 square feet, total elevator area 34.4 square feet.

PERFORMANCE High speed 217 miles per hour at an altitude of 16,400 feet, cruising speed 150 miles per hour at an altitude of 5,000 feet, stalling speed 65 miles per hour climb at sea level 1,280 feet per minute, service ceiling 24,000 feet. Seats three.

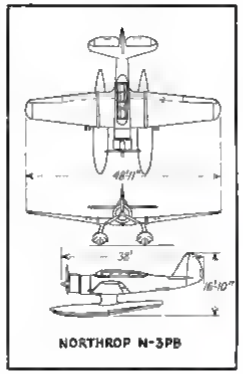
CONSTRUCTION MATERIAL Alclad wing spars, Alclad ribs, Alclad covering.

STANDARD EQUIPMENT Kollsman, Westoo, and Pioneer Instruments Edo floats, Hamilton Standard propeller, Bendix seats, Lear radio.

(For further specifications see table p. 115)



Pontoon Strut



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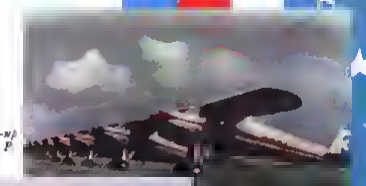

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The Birdmen's Perch

How about those Funnyboners? I want to hear more about those mistakes you made while learning to fly. Send 'em in, pals—here's your chance to confess and tell us why your instructor's hair turned white over night.

Major Al Williams, alias "Tattered Wing-Tips," Mgr., Gulf Aviation Products, Gulf Building, Pittsburgh, Pa.

FUNNYBONER DEPARTMENT

Here's a boner I pulled while learning to fly.

I'd had about 2 or 3 hours dual instruction and was practicing landings with my instructor. I'd completed several pretty good ones and was approaching the runway for another, when the instructor took over the controls.

I thought he intended to keep the controls—and he thought I'd take them right back again. The result was a very bumpy, but successful landing, with nobody at the controls at all!

Winton Smith, Mamaroneck, N. Y.

DON'T TRY THIS ONE IN YOUR BATH TUB!

The hot water tap on a bathtub will fill it in 4 minutes. The cold water faucet

will fill it in 6 minutes. And the drain in the bottom of the tub will empty it in 8 minutes.

With the drain open and both cold and hot water taps on, how long will it take to fill the tub?

YOU'D BE SURPRISED HOW YOU CAN CLEAN UP

If you remember your high school chemistry, you'll recall that one of the first things you were taught was how to use a filter paper.

Probably one of your first experiments was when you took a cloudy, muddy solution and filtered it through a rough filter paper. You found that the solution came through crystal clear, and that the filter paper was stained dark by the residue.

But then, even though your filtrate was crystal clear, you again filtered it, this time through a finer paper. And this time, though the appearance of the solution was just as clear as before, you found to your surprise, that a fine residue had been left behind on the filter paper. You'd made your solution even purer than you thought possible.

You might remember this experiment the next time you're buying oil for your plane. For though many oils look exactly alike, you'd be surprised how much extra impurity you can sometimes get out of them.

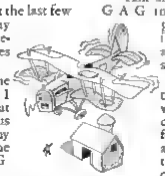
We know, because we refine Gulfpride by means of a special process—the Alchlor Process. And tests have shown that this Alchlor Process removes up to 20% more of the carbon and sludge formers found in oil!

Yes, we know that by taking the extra time and trouble, we can get a lot of *extra* impurities out of oil. That's why Gulfpride is the finest oil you can put into your motor!

THIS MONTH'S WHOPPER (4 Stars)

Dear Major:

I had an old Jenny once and for the last few years she's been setting out in my barn. Sons hated to junk her because we'd had some good times together, Jenny and me.



I was thinking about that the other day—about getting old, I mean—when I spied a story about G A G. Well, it looked like this was just the medicine my Jenny needed. So I hauled her out of the barn and filled her up with G A G. And then the trouble began.

Say, I didn't hardly have time to get out of the way before little Jenny perked right up and the next thing I know she's circling over the barn and heading off towards the city.

All day long I waited pacing up and down the barn floor, and it was long about sundown when I heard a funny kind of sputtering and there comes Jenny.

Gosh, Major, that ship looked like it had met a couple of hurricanes with a tornado in the middle and when I got her back into the barn and kind of got over being so scared I says to her:

"Jenny, I allus said you was a well behaved little ship. And you was. Now, where've you been all day?" And Jenny looked at me kind of reproachful like and she says: "Say, Pop, who fed me that G A G anyway?"

"Well," I says, "that don't answer my question. All by yourself you took off and all by yourself you spent all day in the city and all by yourself you come back again. Now what's the story?"

"Well, this is Jenny's story — Pop, I met an Army Bomber—the handsomest Army Bomber! His approach was perfect. He wiggled his ailerons rather flirtatiously and I wiggled mine back. If it hadn't been for that G A G I'd have been more of a lady!

"We glided along together—even had a couple of wing-overs. Then—then—well he settled down on a soft cushion of air and flipped his flippers invitingly. Pop, can you imagine how I felt? A dashing Army Bomber flipping his flippers at me an old Jenny! And honestly, Pop, I'd reached the hurble point so to speak. I felt like making a power dive for him, but I restrained myself and instead I just settled down too.

"Talk about speed, Pop! They must use G A G in the army too. I'm afraid I completely forgot my excellent training because after a bit of stalling around I—well—I'm afraid I skidded a little.

"And I don't care if I *am* a bit the worse for wear. Although my wings are a mite tarnished and I can't hold my nose as high as before, although my struts and spars aren't what they once were, although my landing gear has collapsed and my shock absorbers were shocked off, although my motor is dead and my prop won't go round, I still say! More power to G A G!"

D. D.

P. S. G A G don't *need* no more power!

Gulf Oil Corporation and Gulf Refining Company . . . makers of

GULF **GULF AVIATION PRODUCTS**

REPUBLIC Lancer P-43

SPECIFICATIONS Span 36 ft overall length 28 ft 5¾ in overall height 10 ft 2¾ in landing gear tread 9 ft 2¾ in wing loading 32 1 lb. per sq ft power loading 5.96 lb per hp., weight empty 5 478 gross weight 7,155 lb powered by P & W Twin Wasp total rated hp. 1,200 at an altitude of 23 000 ft fuel capacity 145 gallons normal range 330 miles, diameter of propeller 11 ft., wing area (including ailerons) 223 7 sq. ft., total aileron area 19.5 sq ft. fin area 10.1 sq. ft., rudder area 9.5 sq ft. stabilizer area 19.2 sq ft, total elevator area 15 9 sq. ft

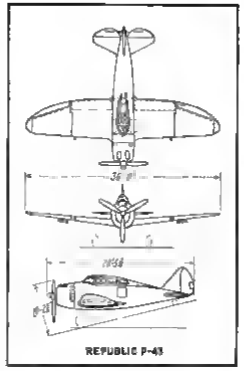
PERFORMANCE High speed 375 at an altitude of 23,000 ft., cruising speed 325 m.p.h., at an altitude of 23,000 ft stalling speed 86 m.p.h. climb at sea level 3 380 ft. per minute

CONSTRUCTION MATERIAL Aluminum alloy wing spars aluminum alloy ribs, Alclad covering material retractable type of landing gear, 30 in smooth contour wheel, hydraulic brakes, Oleo pn shock struts aluminum alloy and Alclad fuselage

STANDARD EQUIPMENT Airspeed, altimeter, compass, air thermometer, tachometer, manifold pressure gage, thermacouple suction gage, clock bank and turn, climb flight fuel level landing gear and flap indicator, hydy pressure gage. Land instrument mannings.

Landing Gear

(For further specifications see p 115)



REPUBLIC P-43

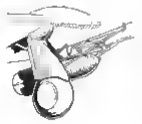
REPUBLIC 2PA

SPECIFICATIONS Span 41 ft., overall length 27 ft., 8 in., overall height 9 ft. 9½ in., landing gear tread 7 ft. 10 in., wing loading 30 lb per sq. ft power loading 7 12 lb. per hp. weight empty 5 146 pounds, gross weight 7 480 pounds It is powered by a Pratt & Whitney Twin Wasp engine, total rated horse power 1050 at an altitude of 11 500 feet Fuel capacity 200 gallons, range 580 miles, diameter of propeller 10 feet 9 inches wing area (including ailerons) 250 square feet, total aileron area 22 square feet, fin area 10.17 square feet rudder area 9 61 square feet, stabilizer area 23 4 square feet, total elevator area 20.9 square feet.

PERFORMANCE High speed 293 miles per hour at an altitude of 11,500 feet, cruising speed 250 miles per hour at 15 000 feet, stalling speed 86 miles per hour climb 2,050 at sea level, service ceiling 28 000 feet.

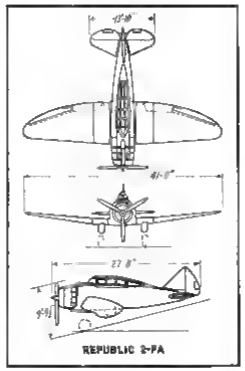
CONSTRUCTION MATERIAL Aluminum alloy wing spars, aluminum alloy ribs Alclad covering 27 in smooth contour wheel, hydraulic brakes, Oleo landing gear shock unit, retractable tail unit.

STANDARD EQUIPMENT Airspeed, altimeter, tachometer, temperature indicator, fuel level manifold press and suction gage, climb, bank, tara indicators.

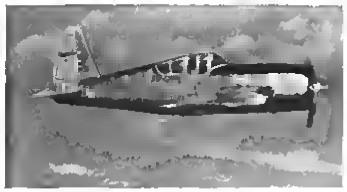


Bomb Carriage

(For further specifications see p 115)



REPUBLIC 2-PA



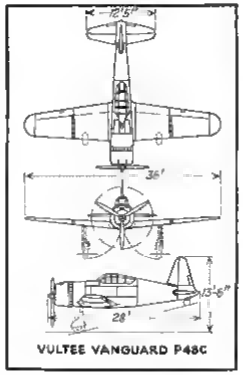
VULTEE Vanguard P-48c

SPECIFICATIONS Span 36 feet, overall length 28 feet overall height 9 feet 5 inches, landing gear tread 100 inches, weight empty 5 841 gross weight 9 182 pounds powered by a Pratt & Whitney Twin Wasp engine, total rated horse power 1,200 at an altitude of 4,900 feet fuel capacity 240 gallons normal range 700 miles, area of wing (including ailerons) 197 square feet. Specifications for Vultee 54 Valiant (pg 96) are span 42 feet, overall length 28 feet 7 inches, overall height 9 feet 1 inch landing gear tread 128 inches, weight empty 2 970 gross weight 3,991 pounds, powered by a Pratt & Whitney Wasp Junior with total rated horse power 450 at sea level, fuel capacity 92 gallons, normal range 730 miles, area of wing (including ailerons) 239 square feet

PERFORMANCE High speed 340 miles per hour, at an altitude of 6,900 feet, cruising speed 290 miles per hour at an altitude of 16 000 feet, service ceiling 33 900 feet Performance for the Vultee 54 Valiant (see pg 96) is high speed 182 miles per hour at sea level, cruising speed 170 miles per hour at an altitude of 5 000 feet, service ceiling 21 900 feet

CONSTRUCTION MATERIAL Welded steel tubing semi monocoque fuselage

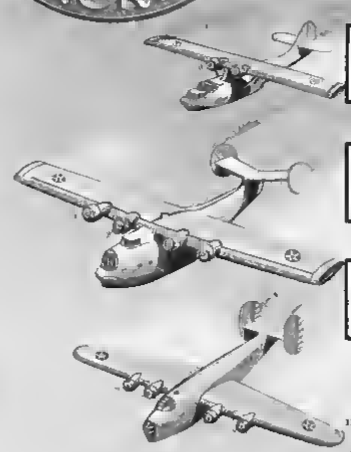
For further specifications see p 115



VULTEE VANGUARD P48C

CONSOLIDATED AIRCRAFT

A VETERAN OF DEFENSE PRODUCTION



PBY series
PB2Y series
B24 series

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* Ships having a wing span of over 100 feet

CONSOLIDATED Aircraft CORPORATION
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TOOL ROOMS

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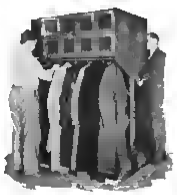
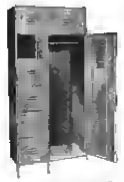


Lyon Shoprobe (Patent No. 2,202,427). Minimum initial cost per person accommodated. Readily moved. Saves floor space—20 persons in each 12 ½ sq. ft.

2-Person Lockers. Individual compartments for two people in some cabinets. Hygienically occupied by single occupancy lockers.



7-Person Lockers. Accommodates seven individuals in floor space of 38" x 20". Individual keys for small compartments all operate large seat compartment.

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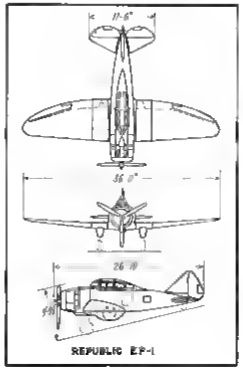
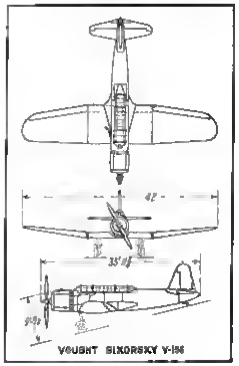


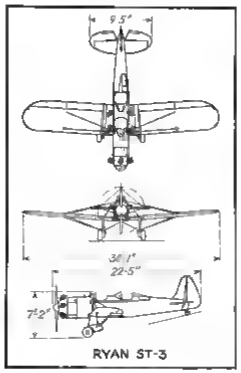
REPUBLIC EP-1

REPUBLIC Model P-35A (EP-1)

VOUGHT SIKORSKY Model V-156



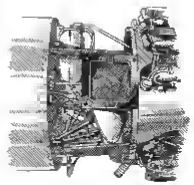
VOUGHT SIKORSKY V-156



RYAN ST-3

SPECIFICATIONS: Span 30 feet 1 inch, length overall 23 feet 3 inches, height overall 6 feet 10 inches. Landing gear tread 78½ inches. Wing loading 13.6 pounds per square foot, power loading 12.2 pounds per horsepower, weight empty 1240 pounds, gross weight 1925 pounds. It is powered by both Menasco and Kinner engines. Total rated horsepower with Kinner engine is 160 at sea level. Fuel capacity 24 gallons. Normal range 266 miles. Propeller diameter 90 inches. Wing area (including ailerons) 134.3 square feet.

PERFORMANCE: High speed 120 miles per hour at sea level. Cruising speed 120 miles per hour. Stalling speed 47 miles per hour. Climbs at sea level 850 feet per minute. Service ceiling 15,800 feet.



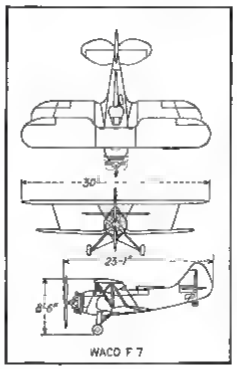
Engine Installation

RYAN Model ST-3

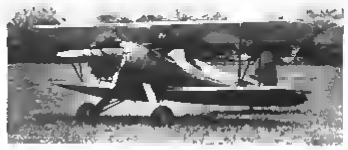
CONSTRUCTION MATERIAL: Wings have solid spruce spars; aluminum alloy ribs, and fabric covering material. Fixed landing gear. Mechanical brakes. Oleo landing gear shock unit. Wheel tail unit. Aluminum alloy monocoque fuselage.

STANDARD EQUIPMENT: Altimeter, oil temperature, oil pressure, tachometer, air speed indicator, compass and fuel gages.

(For further specifications see page 115)

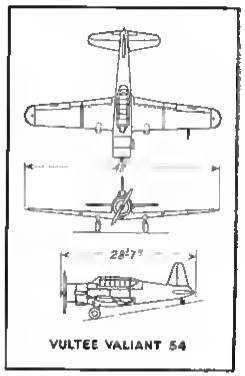


WACO F-7

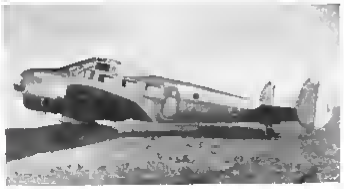


WACO Model LPF-7

VULTEE Model Valiant 54

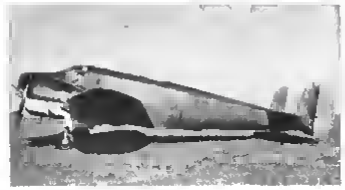


VULTEE VALIANT 54



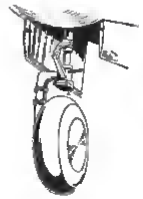
BEECH JRB-1

Tail Wheel
Beech JRB-1



BEECH AT 18R

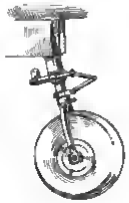
MARTIN B 26



Nose Wheel
Martin B-26

NORTH AMERICAN B-25

DOUGLAS DB 7



Nose wheel
Douglas DB-7

DOUGLAS 8A 5

NORTH AMERICAN AT-6A

Engine Mount
N. Amer. AT-6A

STEARMAN A75L3

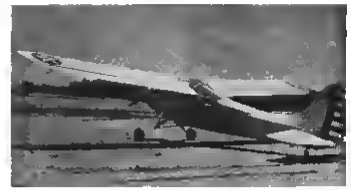
DOUGLAS SBD 1

Tail Wheel
Douglas SBD-1

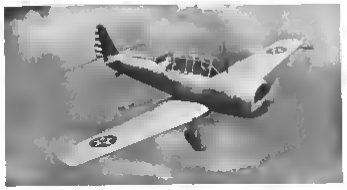
DOUGLAS 8A 20A

RYAN YO 51 (Dragon Fly)

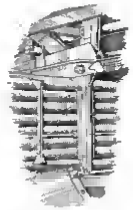
Fowler Flap
Ryan YO-51



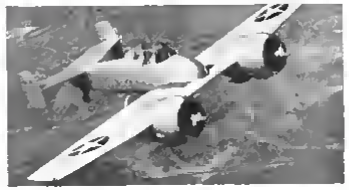
STINSON 0-49



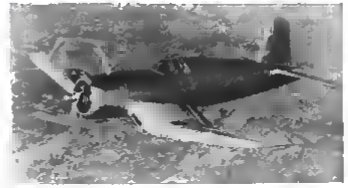
FLEETWINGS XBT-12, Trainer



Front Spar Fitting
Fleetwings XBT-12

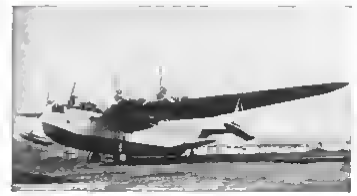


GRUMMAN Skyrocket

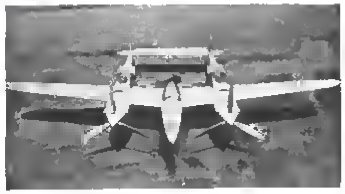


VOUGHT-SIKORSKY XF4U-1

Landing Gear
XF4U-1

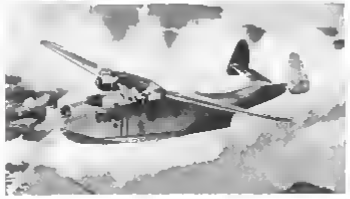


VOUGHT-SIKORSKY XPBS-1



LOCKHEED P-38

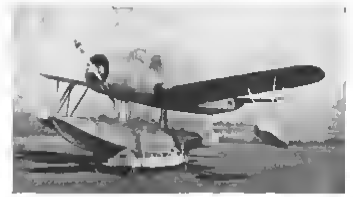
Nose Wheel
Lockheed P-38



MARTIN 162 PBM-1

VULTEE V-12C

Retracting Landing
Gear Strut
Vultee V12C



VOUGHT-SIKORSKY XSO2U-1

For National Defense

U. S. NAVY MODEL F4F-3

These Grumman fighter planes are now being produced in quantity as part of our Government's National Defense Program

GRUMMAN AIRCRAFT ENGINEERING CORP.

BETHPAGE LONG ISLAND NEW YORK

New Grumman "midwing" pursuit monoplane now being built in quantity for Great Britain's Fleet Air Arm and the United States Navy. It is powered by a 1,200 H.P. Wright Cyclone Engine, has a top speed of 350 miles per hour and a ceiling of 37,000 feet.

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WINGS FOR DEFENSE

American military aircraft—like those engaged in the pursuits of peace—are equipped with Timken Bearing Equipped wheels for swift, smooth take-offs and sure-footed landings. Many of them also have TIMKEN Tapered Roller Bearings at other vital points such as engine rocker arms and vibration-dampening engine mounts.

During the last decade of airplane development in the United States, TIMKEN Bearings so greatly have improved ground performance that their use in the landing and tail wheels of airplanes of all types and sizes now is practically 100%.

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Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks railroad cars and locomotives and all kinds of industrial machinery. TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing, and TIMKEN Rock Bits

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THIS TRAINING *places* YOU IN AVIATION *in 4 to 24 months*

Never before has the demand for trained pilots been so urgent as it is today. Airline expansion is actually being retarded because of the acute shortage of competently trained pilots. Flight instructors are in demand everywhere. Because of California Flyers' modern fleet and proven training, it is absolutely impossible for us to supply the requests for graduate pilots.

In aviation the Master Mechanic is the man responsible for the production, operation and maintenance of the world's great air fleets. At California Flyers the Master Mechanic student receives the greatest training that prepares him for a position with airliners and aircraft plants. And it is this training that assures him immediate employment and rapid advancement.

Because the Aeronautical Engineering student at California Flyers trains in the center of modern aviation in America, in the city where half of the Nation's planes are engineered he learns the latest and only in design and engineering but in modern plant practices. Because of this advanced training the California Flyers graduate's services are in demand everywhere.

The Production Mechanic is the Aircraft builder. Because this is the largest field in aviation, the young man entering this branch has unlimited opportunities. At California Flyers the Production Mechanics student is trained to do not only one thing well, but all phases of production from metal forming to final assembly. It is this thorough training that takes him to the top.

Throughout every stage of planning and production the Aircraft Draftsman is the right hand of the men responsible for successful design and engineering of the airplane. The young man enrolling at California Flyers receives training that prepares him for the better. Because of this thorough practical training the graduate's opportunities are unlimited.

With the increased use of instruments the position of Instrument Technician has become of vital importance. At California Flyers the student trains in an active maintenance shop. It is this type of training that prepares him for the many opportunities in the Instrument field—a position in an aircraft plant, an airline, the Civil Service or he may operate his own business.

and WE CAN'T SUPPLY THE DEMAND FOR OUR GRADUATES

Yes, you're that close to a position in aviation! Four months to 24 months from the day you enroll at California Flyers, depending on the course, you will be ready for a position in aviation, a position unparalleled in opportunity. And what is more important, a position is waiting for you for ***it is impossible for California Flyers to supply the demand for its graduates.***

Why does California Flyers put you in aviation faster? Here is the answer. From the day you enroll at California Flyers you are *in* aviation, preparing to do your share in the Defense Program. No time is wasted in unrelated, academic subjects. What you get is thorough, practical, industry training geared to the needs of the aviation industry and geared to the needs of our National Defense. What is more important, this training is specified training specified by the industry to fulfill its needs.

California Flyers is not only located in the Nation's Aviation Capital but on the very airport that is the home of these famous aircraft plants.

California Flyers is one of the few schools in the country that recognizes the vital need for specialized training, the need not only for Aeronautical Engineers, but for Aircraft Draftsmen—not only for Master Mechanics, but for Production Mechanics and Instrument Technicians—not only for Airline Pilots, but for Commercial Pilots and Flight Instructors. So it is that California Flyers gives you the opportunity of choosing a particular course that best suits your natural talents, and gives you the training which in a shorter space of time fits you for a career in the particular branch of your chosen field.

Why is there such an unprecedented demand for our graduates? An important reason is California Flyers' location in the very heart of aviation in America, on the same airport with the plants of North American, Douglas-El Segundo and Interstate, on the very test field where the famous planes of Douglas, Lockheed, Northrop and Vultee have been tested and proved, in the city which is a terminus for United Airlines, Transcontinental and Western Air, American Airlines and Western Air Express. It is a school that is an integral part of this aviation picture. It is a school which through day to day personal contact works hand and hand with the industry, meeting the industry's personnel problems with men trained to its specifications. *Is it any wonder that this school cannot supply the demand for its graduates?*

California Flyers is not only approved by the United States Government for Flight and Master Mechanics Courses, selected by the Civil Aeronautics Authority for primary and advanced flight training, but it is one of the few schools chosen by the U. S. Army Air Corps to train its aviation mechanics. It is the school you, too, should choose.

CLIP THE COUPON ON OPPOSITE PAGE

"I am a California Flyers Graduate." It means something to say that. It means that aviation wants you to the extent that over 96% of all California Flyers graduates are employed in the industry and there are consistently more requests for our graduates than we can supply. It is a passport into aviation. It means also that you are a man marked to succeed like the California Flyers men before you. And that is what *really* counts.

Why does a California Flyers man stand so high? It is obvious once you have heard the complete story of this famous school. Its founders believe that aviation should be taught in a school where the student remains an individual—learning aviation as it pertains to his individual ambitions and qualifications, and by so doing he is prepared for the responsibilities of leadership. This trains the graduate to meet today's aviation problems and to contribute to tomorrow's aviation advancement. This is the way today's leaders learned. Only this way can a training program be built for the industry, on industry specifications. They believe too that the entire field of aeronautics—engineering, mechanics and piloting are all closely interwoven and that a student should train in a school that teaches all of these important divisions. Above all, they believe that aviation should be taught in an environment of aviation activity, taught where there is the greatest number of men actively engaged in aviation. This is why California Flyers is located in the heart of the world's aviation capital on the world's busiest testing field.

If this is the kind of school you would like... friendly, efficient, modern and thorough, an aeronautical school operated by practical aviation men, you will be most interested in reading the *complete* story of California Flyers in the new 64 page catalog.

• Write for new 64 page catalog, get complete information on all of California Flyers' aviation training courses, tuition and employment opportunities.

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LEARN ABOUT THIS COMPLETE RANGE OF PRACTICAL CAREER COURSES

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Please send me your Catalog and Vocational Guide with complete information on training, tuition, living conditions and employment opportunities. I am over 16 and interested in the subjects, checked:

Aeronautical Engineering ☐ *Airline Piloting* ☐
Production Mechanics (Aircraft sheet metal) ☐ *Aircraft Drafting* ☐
Instrument and Radio Beam Flying ☐ *Master Mechanics* ☐
Instrument Technician ☐

Name_____ Age_____

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City_____ State_____

A *VETERAN AT TWO*... Back in the early twenties, when aviation was still in its adolescence, the supervisory personnel of the present Northrop Company was actively engaged in the aircraft industry. These men, who are responsible for today's Northrop planes, enjoy on average of over 16 years of aviation experience. Though its corporate existence reaches back barely two years, today Northrop Aircraft, Inc. is a veteran at two.

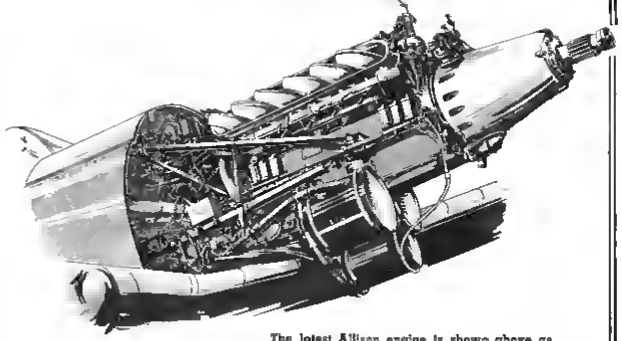
Now, when production is so all-important, this background of aviation experience accounts for the records being established at the Northrop plant. It is reflected, too, in the superior performance of Northrop built planes. This is another reason to WATCH NORTHROP.

Starting from scratch in March 1939, the greatly expanded Northrop plant will soon house more than five thousand employees. Here at record production speed are manufactured planes and plane parts for the fighting forces of five democratic peoples.

NORTHROP AIRCRAFT, INC. • AN INDEPENDENT ORGANIZATION

NOT AFFILIATED WITH ANY OTHER AIRCRAFT COMPANY

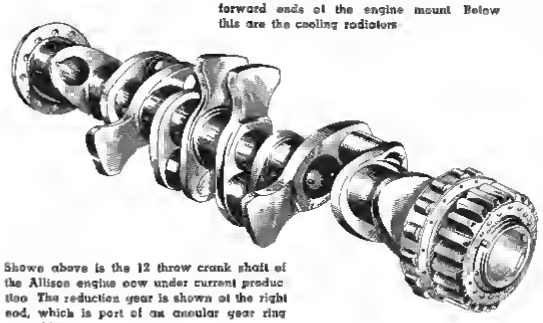
NORTHROP AIRCRAFT, INC. • NORTHROP FIELD, HAWTHORNE, CALIFORNIA, U.S.A. • CABLE "NORAIR"



The latest Allison engine is shown above as it is installed in a Curtiss P-40. Notice the method of supporting the engine from the forward ends of the engine mount. Below this are the cooling radiators.

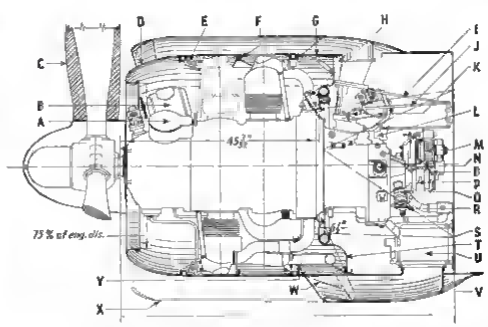
AMERICAN AIRCRAFT ENGINES FOR 1941

With sketches and photographs of engines and installations, AVIATION presents a cross section of American aircraft engines.

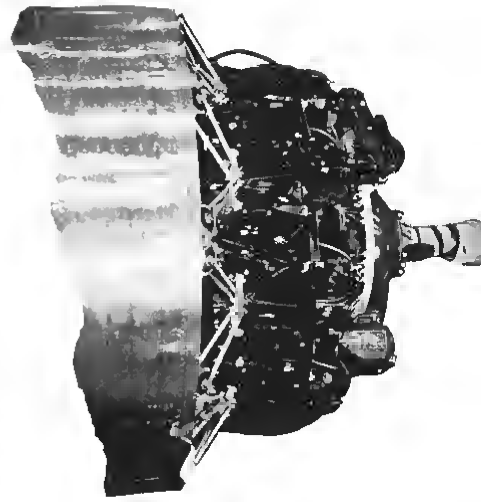


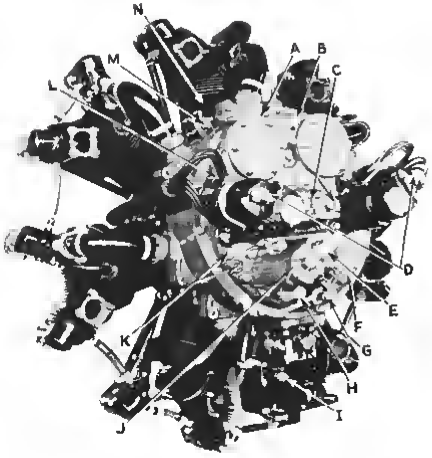
Shown above is the 12 throw crank shaft of the Allison engine now under current production. The reduction gear is shown at the right end, which is part of an annular gear ring assembly.

The Wright Duplex Cyclone engine is shown below as it is installed in the Douglas B-18 Super Bomber. Note the vibration dampening engine mount consisting of nine pairs of mountings spaced at regular intervals around engine mount ring.

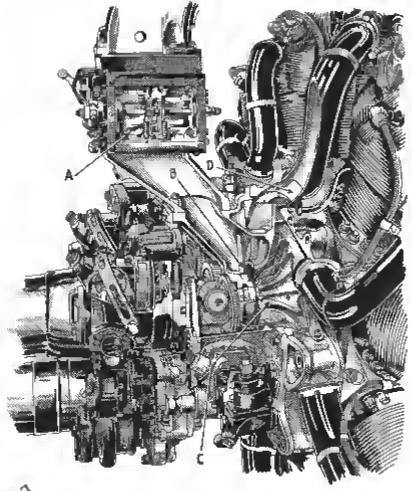


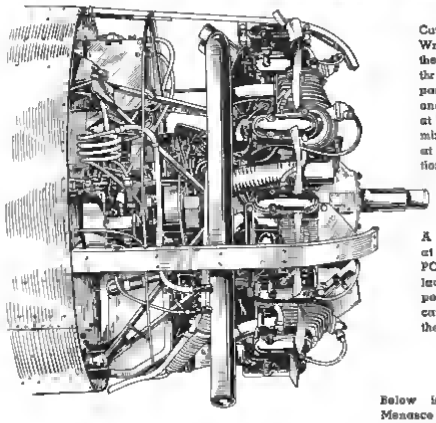
Shown above is a typical power plant installation of the latest Pratt and Whitney R-2800 single stage twin row engine. Around this is placed one of the most recently designed cowls which has caused considerable comment because of its effective cooling. The letters on the drawing refer to A—distributor; B—magneto; C—propeller cuffs; D—N.A.C.A. high speed nose contour; E—flexible cowl support ring mount; F—seal between engine baffles and cowling; G—carburetor pre-heat valve; H—rotated true view of pedestal; I—throttle control; J—mixture control; K—injection carburetor; L—supercharger speed control; M—starter; N—gun synchronizer; O—generator; P—vacuum pump; Q—hydraulic pump; R—fuel pump; S—engine mount ring; T—stamped stainless steel diaphragm; U—dual oil coolers; V—flexible seal between inner and outer diaphragm; W—location of side cowl flaps; X—alternate scoop; Y—exhaust stack slip joint front cylinders only.





The Jacobs Model L-4PT radial engine above develops 225 hp. The letters on the engine denote: A—starter pad. B—oil tank vent connection. C—tachometer connections. D—ground connections. E—oil outlet connection. F—fuel pump pad. G—oil inlet connection; H—relief valve; I—fuel inlet connection; J—cuno strainer; K—oil pressure connections; L—booster connections; M—primer inlet connection; N—breather connection (hidden).

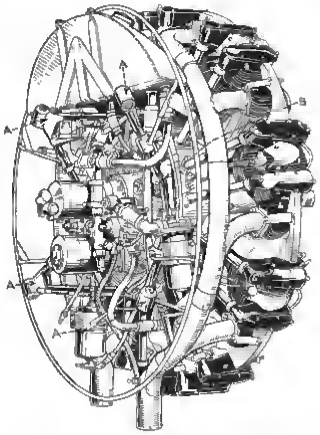


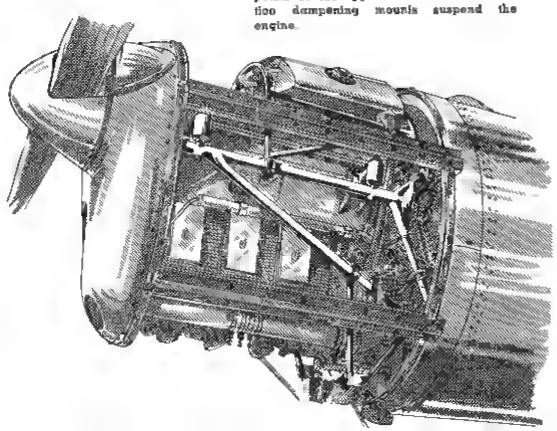


Cutting away the rear section in a Wright G-100 series engine we find the carburetor located at "A" through which the air and gasoline pass down through the intake "B" and into the supercharger impeller at "C", from here the supercharged mixture enters the cylinder intakes at "D" and then into the combustion chamber.

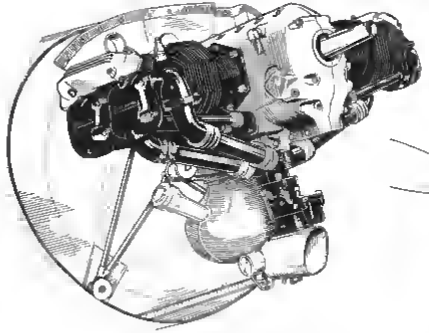
A Warner 185 hp. engine is shown at the left installed in a Harlow PC-5A. The engine mount is attached to the fuselage at four points and the engine ring is located in the drawing, underneath the exhaust ring.

Below is a typical installation of a Guiberson A-1020 Aircraft Diesel engine. Note the four engine mount attachment fittings at "A" while the engine itself is attached to the engine mount ring "B".

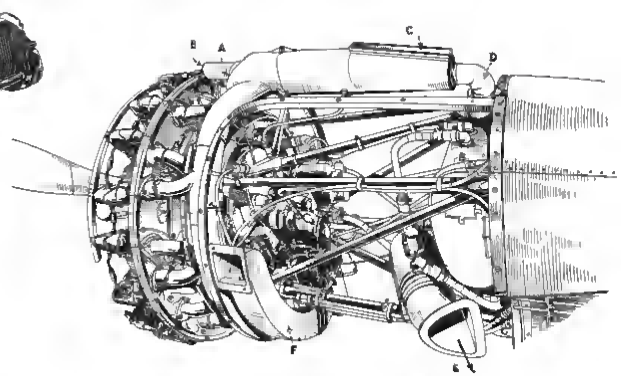




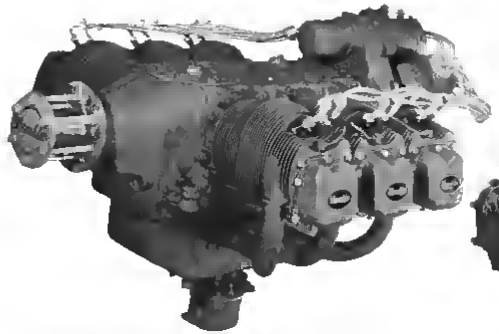
Below is a typical installation of a Menasco engine in a Ryan ST Trainer. Note the two points, with two similar points on the opposite side where vibration dampening mounts suspend the engine.



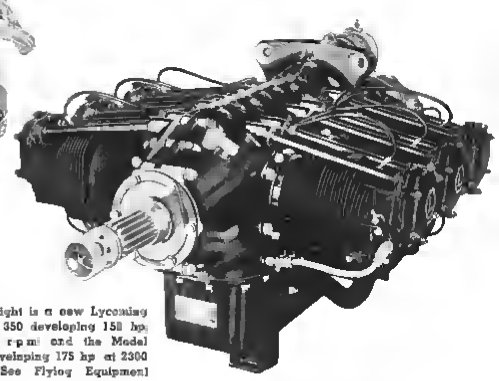
A Continental engine (above) is installed in a Luscombe Model 8A. Directly below the engine is located the oil tank.



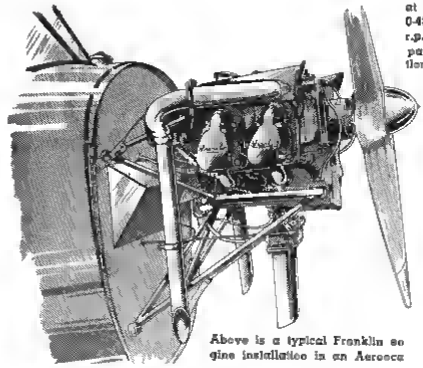
Above is a Pratt & Whitney Wasp Jr. installed in a Grumman G-21 Amphibian. "A" is the exhaust manifold with its exhaust port at "C". "B" is where cabin ventilating air enters the heating pipe which passes through the exhaust manifold and enters the cabin through "D". "F" is the carburetor air intake and "E" is the oil radiator outlet.



Above is the recently announced Franklin six cylinder Model 6AC-298-F3 engine of the latest design. This engine develops 130 hp. at 2550 r.p.m.

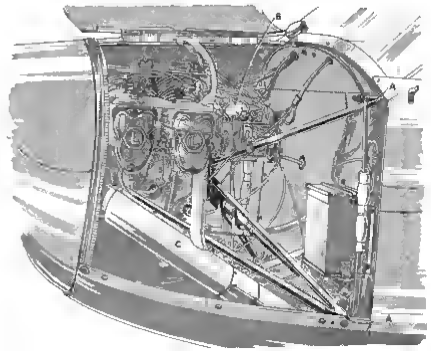


Above right is a new Lycoming Model O-350 developing 158 hp. at 2500 r.p.m. and the Model O-435 developing 175 hp. at 2300 r.p.m. (See Flying Equipment page 139 for complete description)



Above is a typical Franklin engine installation in an Aeronca

Below is a close-up showing a dual ignition 75 hp. Lycoming engine installed in a Funk Model L. The mount is attached at "A" and the engine is supported at "B" and at a similar point at the forward end.



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COSTS NO MORE THAN A FIXED PACK

The QUICK ATTACHABLE feature is a hit! It enabled pilots to combine freedom on the ground with safety in the air.

Weighing less than a suit of clothes, the Switlik *harness* is worn independently from the pack. You enjoy comfort and freedom of movement not possible with any other make of chute. Adopted as standard by U. S. Navy, Coast Guard and many foreign governments.

Keeping the *pack* in the plane seat or back saves it from wear and tear—and it's right there ready to attach when you climb in.

Switlik *Quick Attachable* Parachutes, available in three models—Seat, Back and Chest, to conserve headroom or legroom.

SWITLIK 1941 HANDBOOK *Mailed Free*

Now ready—Switlik 1941 Parachute Handbook, fully illustrated instructions on care and handling; also specifications and descriptions of all Switlik models. Mailed free on request.

VALUABLE FRANCHISES AVAILABLE

World-wide reputation of Switlik Safety Chutes is rapidly increasing the already wide-spread demand. New opportunities constantly arise for responsible and properly equipped firms to act as Switlik *factory representatives* to handle our business in their respective areas. Correspondence invited.

Legroom! . . . Headroom! . . . and a seat that doesn't rock! You'll be pleasantly surprised by these added advantages of the thin, comfortable, flat bottomed seat pack and light weight harness of the Switlik *Quick Attachable* Safety Chute.

Place the pack in your seat and go about your chores unhampered. When you're ready—climb in, snap only two connectors—and your chute is *attached.*

Cubs and most light planes are especially provided for by the Switlik *Quick Attachable* Back Pack. Thin pack sinks snugly into chair back, retaining normal legroom and head room.

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1–3 Seats

Manufacturer	Designation of Model No.	A.T.C. number	Price (at factory, $)	Type	Number of seats	Make of engine	Total rated h.p.	At altitude, ft.	Fuel capacity (gal.)	Normal range (mi.)	Fuel consumption (gal. per hr.)	Oil consumption (gal. per hr.)	Propeller diameter—(dia.)	High speed (m.p.h.)	At altitude, ft.	Operating speed (m.p.h.)	At altitude, ft.	Stalling speed (m.p.h.)	Climb, at sea level (ft. per min.)	Service ceiling (ft.)	Wt. landing (lbs. per sq. ft.)	Power loading (lbs. per h.p.)
Aeronautical Corp. of America	A-1	675	1,795	CML	2	Con.	65	S.L.	12	250	4 3		76	105	S.L.	90	S.L.	35	650	15,000	6 6	17 7
Aeronautical Corp. of America	A5-LA	675	1,795	CML	2	Con.	65	S.L.	12	250	4 3		76	105	S.L.	90	S.L.	35	650	15,000	7 4	19 23
Aeronautical Corp. of America	A5-LB	700	1,895	CML	2	Con.	65	S.L.	12	250	4 3		76	105	S.L.	90	S.L.	35	650	15,000	7 4	19 23
Aeronautical Corp. of America	A5-TL	720	2,425	CML	2	Lyc.	65	S.L.	12	250	4 0		70	105	S.L.	90	S.L.	35	650	15,000	6 6	17 7
Air Transport Mfg. Co., Ltd.	G-2	482		CML	2	K	100	S.L.	30	450	7 0		62	130	1,000	100	S.L.	40	1,000	14,000	10 12	16 5
Air Transport Mfg. Co., Ltd.	G-3	482		CML	2	K	100	S.L.	30	450	7 0		62	135	1,000	100	S.L.	40	1,000	14,000	10 73	17 5
Akron Aircraft, Inc.	Funk B	739	1,950	CML	2	Lycoming	65	S.L.	16	400	4 0		76	112	S.L.	90	S.L.	37	750	16,000	8 0	21 75
Akron Aircraft, Inc.	Funk L	715	2,160	CML	2	Lyc.	75	S.L.	18	550	4 5		76	112	S.L.	90	S.L.	37	800	17,000	8 0	18 0
Aeglepuis Amphibians	*Y No 1*		7 500	A	2	*Ly 290*	75	S.L.	18	550	4 5		72	105	S.L.	85	S.L.	40	450	11,000	8 68	20 0
Bellanca	14-9 Cruisair	716		CML	2	Ser Royce (Lehl)	90	S.L.	20	420	5 0		74	135		120	3,000	45	750	14,000	10 8	15 4
Culver Aircraft Corp.	Culver Cadet Model LCA	730	2 395	CLM	2	Con	75	S.L.	20	600	4 35		70	140	S.L.	120 Guar.	S.L.	45	800	17,500	10 83	17 40
Engineering & Research Corp.	Ercoupe 415C	719	2 590	CLM	2	Con.	65	S.L.	14	550	4 0		72	117	S.L.	95	3,000	40	800	14,000	8 2	18 1
Fairchild Aircraft	M-62	724		CML	2	Ran	175	S.L.	45	550	10 0		56	140	S.L.	120	S.L.	50	835	16,100	12 25	14 0
Gwinn Aircar Co., Inc	Aircar-1	682		CML	2-3	Ford V	85	S.L.	25	525	5 0		84	105	S.L.	85	S.L.	41			7 0	18 0
Gwinn Aircar Co., Inc	Aircar-2			CML	2-3	Ford V	130	S.L.	25	595	6 0		84	125	S.L.	100	S.L.	41			7 0	15 1
Harlow Aircraft	PJC-2	659		CLM	2	Warner	145	S.L.	34	500	9 5		84	145	S.L.	140	S.L.	52	680	12,500	14 03	17 94
Harlow Aircraft	*PC-5A*			CLM	2	Warner	165	S.L.	34	600	10 0		84	154	S.L.	140	S.L.	52	740	14,500	14 05	13 23
Howard Aircraft Corp	DGA-15P		On req.	CML	2	Warner	125	S.L.	37	365	8 5	85%	84	118	S.L.	100	S.L.	50	600	13,500	10 0	15 0
Interstate Aircraft & Engineering Corp.	S-1 Cadet	2,558		CLM	2	Con	50	O	12	350			76	113	O	93	O	34	500	12,500	8 7	23 0
Interstate Aircraft & Engineering Corp.	*S-1A Cadet*			CLM	2	Con	65	O	15	375			76	117	O	97	O	36	700	14,500	6 9	18 5
Interstate Aircraft & Engineering Corp.	*S-1A-65F Cadet*			CLM	2	Pr	65	O	15	375			76	117	O	97	O	36	700	14,800	6 9	18 5
Johnson Aircraft Corp.	*JA 5*		1 795	CML	2	Lyc	65	S.L.	15	350	4 0		72	100	S.L.	90	S.L.	39	600	15,000	6 6	16 8
Kellett Autogyro Corp.	KD-1B	712		CLGY	1	Ja	225	S.L.	50	205	14 0	102	22	102	S.L.	80	S.L.	No	1,060	14,000	40 8	10 0
Kellett-Autogyro Corp.	KD-1	712		CLGY	1	Ja	225	S.L.	50	205	14 0	102	22	125	S.L.	100	S.L.	No	1,060	14,000	40 6	9 56
Luscombe Airp. Corp.	8	694	2 195	CML	2	Con.	65	S.L.	15	330	4 25		76	115	S.L.	95	S.L.	38	750	15,000	8 6	16 5
Luscombe Airp. Corp.	8-A Seaplane	698	3,150	CML	2	Con	65	S.L.	15	350	4 25		76	103	S.L.	85	S.L.	38	550	10,000	9 0	19 4
Luscombe Airp. Corp.	8-B1	674	1 735	CML	2	Lyc	65	S.L.	15	375	4 00		76	112	S.L.	102	S.L.	37	900	15,000	8 6	18 5
Luscombe Airp. Corp.	8-C Silvaire	694	2 715	CML	2	Con	75	S.L.	15	550	4 75		72	120	S.L.	110	S.L.	37	1,100	17,000	8 6	18 7
Mono Aircraft Corp.	Deluxe 90-A	306	4,350	CML	2	War	125	S.L.	28	600	8 5		78	130	1,000	110	S.L.	40	1,000	15,000	12 2	17 9
Monocoupe Corp.	Deluxe 90-A	306	3 595	CML	2	Lan	90	S.L.	28	600	4 0		78	150	S.L.	110	S.L.	40	900	15,000	12 2	17 9
Monocoupe Corp.	110-Special	327	5 600	CML	2	War	145	S.L.	28	530	9 5		78	186	S.L.	162	S.L.	55	2 100	23,800	17 4	11 3
Naugle Aircraft Co.	*Mercury N-1*		*Under 1 700*	*CLM*	2	*Ly*	75	S.L.	15	450	4 0		72	145	S.L.	130	S.L.	45	1 200	20,000	8 5	15 5
Naugle Aircraft Co.	*Mercury N-2*		*Under 2 000*	*CLM*	2	*Hly*	75	S.L.	20	600	4 6		68	100	S.L.	140	S.L.	45	1 200	20,000	9 0	16 2
Phillips Aviation Co.	1-B	695	5 000	CML	2	Men	125	S.L.	45	720	8 5		84	140	S.L.	130	8 000	40	710	13,500	13 0	12 0
Piper Aircraft Corp.[46, 48]	J-5 Cub Trainer	*660	995	CML	2	A-40-4,5 (Con A-40)	40	S.L.	9	200	5 0		69	65	S.L.	70	S.L.	38	400	10,000	5 6	25 0
Piper Aircraft Corp.[47, 48]	J-5C-65 Cub Trainer	*691	1 498	CML	2	A-65-8 (Con A-65)	65	S.L.	12	240	4 0		72	90	S.L.	85	S.L.	39	675	12,000	8 10	17 0
Piper Aircraft Corp.[47, 48]	J-5C-50 Cub Tdeuge	*691	1 368	CML	2	(50-1 cr 3) (Con A-50)	50	S.L.	12	250	3 8		76	91	S.L.	80	S.L.	40	650	12,000	8 10	22 0
Piper Aircraft Corp.[48]	J-3F-65 Cub Trainer	*692	1 298	CML	2	Fr AG-1 50126	50	S.L.	12	260	3 5		70	80	S.L.	70	S.L.	40	600	12,000	6 10	22 0
Piper Aircraft Corp.[47, 48]	J-3L Cub Trainer	*698	1 298	CML	2	Ly D-145	50	S.L.	12	260	3 5		70	00	S.L.		S.L.	40		12,000	6 10	22 0
Piper Aircraft Corp.[47, 48]	J-4 Coupe	*705		CML	2	Con A-75	75	S.L.	25	520	4 6		70	100	S.L.	95	S.L.	41	700	12,000	7 1	19 0
Piper Aircraft Corp. 4, 2	J-4 Coupe	721	1,898	CML	2	Ly O-145	65	S.L.	16	382	4 0		70	100	S.L.	87	S.L.	41	600	12,000	7 1	20 0
Piper Aircraft Corp. 4, 2	J-5 Cruiser	725	1 795	CML	3	A-75 Con	75	S.L.	18	520	4 6		72	100	S.L.	87	S.L.	42		10,000	8 1	19 4
Piper Aircraft Corp.	J-5 Cruiser	725	1 795	CML	3	Ly-O-O-145	75	S.L.	18	520	4 6		72	100	S.L.	93	S.L.	42	475	10,000	8 1	19 4
Piper Aircraft Corp.	J5L-65 Trainer	693	1 298	CML	2	Ly-O-145-21	65	S.L.	12	250	4 0		70	90	S.L.	80	S.L.	38	675	12,000	8 10	17 0
Pilgrim Autogiro Co.	*PA 36*			*LCGY*	1	*War*	175	S.L.	36	375	10	92	17	107	S.L.	0		0	805	15,000	142	11 7
Porterfield Aircraft Corporation	CP 50	690	1 465	CML	2	Con	50	S.L.	11	320	4 0		76	104	S.L.	93	S.L.	35	490	15,000	6 9	21 1
Porterfield Aircraft Corporation	CP-65	720	1 665	CML	2	Con	65	S.L.	15 5	290	4 75		72	111	S.L.	90	S.L.	38	670	15,000	6 9	17 0
Porterfield Aircraft Corporation	LP-65	730	1 695	CML	2	Lyc m	65	S.L.	15 5	290	4 5		69	109	S.L.	90	S.L.	35	500	15,000	6 9	17 9
Porterfield Aircraft Corporation	*FP-65*		*1 560*	*CML*	2	*Franklin*	65	S.L.	13 5	290	4 5		72	107	S.L.	90	S.L.	33	600	16,000	6 8	18 5
Porterfield Aircraft Corporation	*75-C*		*1 795*	*CML*	2	*Con*	75	S.L.	20	550	5 0		70	118	S.L.	105	S.L.		800	17,000	7 0	11 7
Porterfield Aircraft Corporation	90	611		CML	2	War	90	S.L.	16	530	6 5		80	136	S.L.	120	S.L.	48	1 050	20,000	9 0	14 7
Rearwin Aircraft & Engines, Inc.	Sportster-7000	*574	2 795	CML	2	K-R	70	S.L.	24	500	4 0		76	115		100	S.L.	45	670	15,000	8 0	20 0
Rearwin Aircraft & Engines, Inc.	Sportster-9000KR	*591	3 295	CML	2	K-R	90	S.L.	24	500	4 0		76	125		110	600	50	800	15,000	8 0	16 2
Rearwin Aircraft & Engines, Inc.	Sportster-9000	*624	On req.	CML	2	War	90	S.L.	24	450	5 7		76	125		110	600	53	1 200	18,000	8 0	16 2
Rearwin Aircraft & Engines, Inc.	Speedster-4,000M	561	4 495	CML	2	Men	125	S.L.	34	575	8 0		76	150		130	800	48	1 300	18,000	11 68	13 6
Rearwin Aircraft & Engines, Inc.	Cloudster-2,090	711	3 795	CML	2	Ly-H	90	S.L.	34	650	5 0			125		110	600	48	750	14,000	10 11	16 13
Rearwin Aircraft & Engines, Inc.	Cloudster-4125	711	4 295	CML	2	K-R	125	S.L.	34	625	7 0			143		120	600	48	1 000	17,000	10 75	14 45
Rearwin Aircraft & Engines, Inc.	Cloudster-8135	711	4 495	CML	2	K-R	120	S.L.	34	600	7 0			125		100	800	50	900	15,000	11 12	15 0
Rearwin Aircraft & Engines, Inc.	*Skyranger 165*		*7 795*	*CML*	2	*Con*	65	S.L.	24	500	5 65			105		90	800	58	1	17,000	0 2	20 77
Rearwin Aircraft & Engines, Inc.	Skyranger 175	729	2 295	CML	2	Con	75	S.L.	24	500	4 45			110		100	800	55	625	14,000	0 2	18 0
Rearwin Aircraft & Engines, Inc.	*Skyranger 180-P*		*1 475*	*CML*	2	*Franklin*	80	S.L.	24		4 7			115		100	800	58	720	15 500	0 2	16 9
Rearwin Aircraft & Engines, Inc.	*Skyranger 190-F*		*2 525*	*CML*	2	*Franklin*	90	S.L.	24		5 2			122		100	800		900	16 000	0 2	15 0
Ross Aircraft Corp.	RS-1	732	875	OML	1	Ken	65			240	5 0		69	85					360		4 0	23 5
Ross Aircraft Corp.	*RS-2*		*940*	*ML*	2	*Ly*	50			240	5 0		71	80		80			400	10 000	0 4	18 0
Ryan Aeronautical Co.	S-C	656		CML	3	War	145	S.L.	57	525	9 5		82	150	S.L.	135	8 500	45	900	17,200	10 7	14 8
Ryan Aeronautical Co.	S-T-A	553		OML	2	Men	125	S.L.	34	506	6 0		80	130	S.L.	110	6 000	54	900	16,000	12 8	13 0
Ryan Aeronautical Co.	S-T-A Special	681		OML	2	Men	150	3,000	34	526	10 0		80	142	7 000	128	5 000	54	975	19,600	12 9	10 7
Skylark Aircraft Corp.	Skylark W-1-421	2-546		OCML	2	War	125	S.L.	51	545	6 0		90	130	S.L.	117	S.L.	35	800	19,000	10 0	15 2
Southern Aircraft Corp.	*SM 10A*			*O-S*	2	*Ly*	175		47	355			110	125		105		50	850	15 000	9 10	12 4
Southern Aircraft Corp.	*SM 10B*			*SR*	2	*Jn*	225		47	555			102	125		105		50	850	15,000	9 10	17 4
Southern Aircraft Corp.	*SM 10C*			*R*	2	*Con*	225		47	355			102	125		105		50	850	15 000	9 10	11 4
Starman Jensen	*A*			*LM*	2	*Ly*	65	S.L.	20	450	4 7		70	115	S.L.	105	S.L.	45	750	14,000	0 68	17 63
St. Louis Aircraft Corp.	*PT-1*		14 000	*TP-ML*	2	*Wi*	775	S.L.	45	358	13 9		100	150	S.L.	138	S.L.	55	680	15,000	9 4	13 5
St. Louis Aircraft Corp.	*PT-LM-4*		10 000	*TP-LM*	2	*Men*	525	S.L.	42	345	11 4		87	170	S.L.	150	S.L.	57	1 000	18,000	12 0	11 7
Stinson Aircraft	*Standard*		5 535	*CML*	2	*Ly*	90	S.L.	20				74	115	S.L.	110	S.L.	45	800	14,500	10 5	16 0
Stinson Aircraft	*Super-Deluxe*		5 995	*CML*	2	*Ly*	90	S.L.	20				74	115	S.L.	110	S.L.	45	800	14,500	10 5	16 0
Sunwell Aeronautical Corp.	H-65			CLM	2	Con	65	000	12	600	4 7		70	125	S.L.	100	S.L.	47	800	15,000	11 25	17 2
Taylorcraft Aviation Corp.	BL-65	696		CML	2	Ly	65	S.L.	12	250	3 75			105	S.L.	95	S.L.		640	15 000	6 0	17 7
Taylorcraft Aviation Corp.	BL-T (Trainer)	*700		CML	2	Ly	50	S.L.	12	270	3 5			97	S.L.	88	S.L.		450	13,000	6 0	23 0
Taylorcraft Aviation Corp.	BO12-65	698		CML	2	Con	65	S.L.	18	375	4 9		72	105	S.L.	95	S.L.		600	15,000	7 1	16 4
Taylorcraft Aviation Corp.	BL12-65	700		CML	2	Ly	65	S.L.	18	375	4 0		72	105	S.L.	95	S.L.		600	15,000	7 1	16 4
Taylorcraft Aviation Corp.	*BF17-85*			*CML*	2	*Franklin*	65	S.L.	18	375	4 0		72	105	S.L.	95	S.L.		600	15 000	7 1	16 4
Timm Aircraft Corp.	SF60-C			CML	2	K	125	S.L.	34	770	9 5		99	150	S.L.	120	S.L.		900	17,000	10 45	13 7
Timm Aircraft Corp.	*TT175-K*			*ML*	2	*K*	175	S.L.		400	10		99	145	S.L.	126	S.L.		700	17,500	15 15	13 7
Waco Aircraft Co.	UPF-7	647		OML	2	ConRi	220	S.L.	50	10 402	12 5			126	S.L.	100	S.L.	51	949	14,300	10 65	12 06
Waco Aircraft Co.	YPF-7	586		OCL	2	JuRi	225	S.L.	50	10 440	12 4			130	S.L.	110	S.L.	51	921	15,000	10 85	11 60
Waco Aircraft Co.	*UPF-7*			*OML*	2	*Lyhi*	220	S.L.	50	10 320	12 5			126	S.L.	100	S.L.	51	949	14,300	10 65	12 06
Wally Tients, Inc.	Aero-Craft	753		OML	2	Kinner	160	S.L.		400				125	S.L.	115	S.L.	45	1 100	17 500	10 9	13 5
Welch Aire. Industries, Inc.	OW5M	657	995	CML	2	Con	65	S.L.	9	250	5 0		65	95	S.L.	85	S.L.	32	660	12,000	6 9	25 7
Welch Aire. Industries, Inc.	OW6M	656	995	CML	2	Con	65	S.L.	9	250	5 0		66	95	S.L.	85	S.L.	32	675	12,000	6 9	26 0
Welch Aire. Industries Inc.	*OW7M*		995	*CML*	2	*Welch 0-2*	45	S.L.	9	250	5 1		70	90	S.L.	68	S.L.	30	500	15 500	5 99	20 0
Welch Aire. Industries, Inc.	*OW8M*		*1 195*	*CML*	2	*Franklin*	50	S.L.	10	290	5 5		72	100	S.L.	90	S.L.	32	650	14,000	6 6	19 0
Welch Aire. Industries, Inc.	OW9M Trainer	2-474	890	CML	2	Con	50	S.L.	9	250	3 0		69	93	S.L.	85	S.L.	32	660	12,000	6 6	25 7
Welch Aire. Industries Inc.	*OW9M*		*1 595*	*CML*	2	*Lyc*	55	S.L.	10	250	5 2		72	100	S.L.	90	S.L.	32	655	14,000	6 6	19 0
Wendl Aircraft Corp.	*W-2*		*3 775*	*7 Pmnl*	2	*Ki.Lell*	90	S.L.	25	600	5		78	152	—	175	7 500		1 000	18,000	10 0	15 5
White Aircraft Corp.	*PT-7*			*OLH*	2	*War KH5-32*	160		36	532 5				118		95		46	1 000		9 22	13 6

craft Specifications

sponsibility for the figures given

ghts		Dimensions			(Area —Sq. Ft.)						Wings			Landing Gear						Fuselage or Hull †
Weight empty	Gross weight (lbs.)	Span	Length overall	Height overall	Wing (including ailerons)	Ailerons (total)	Fin	Rudder	Stabilizer	Elevators (total)	Spars	Ribs	Covering material	Type	Tread (in.)	Wheel type and size	Brakes (type and make)	Landing gear shock unit (type and make)	Tail unit	
675	1,150	36'	21'1"	6'	169	19 8	6 5	8 2	13 6	11 54	Sol,Sp	Sp	Fab	Fx	72	Sh 6.00x6	Sh,Mech	Ol	SkWh	ST,Wl,Fab
730	1,250	36'	21'1"	7'	169	19 8	6 5	8 2	15 6	11 54	Sol,Sp	Sp	Fab	Fx	72	Sh 6.00x6	Sh,Mech	Ol	SkWh	ST,Wl,Fab
730	1,250	36'	21'1"	7'	169	19 8	6 5	8 2	15 6	11 54	Sol,Sp	Sp	Fab	Fx	72	Sh 6.00x6	Sh,Mech	Ol	SkWh	ST,Wl,Fab
700	1,150	35'	22'4"	6'6"	169	19 7	6 5	8 2	15 6	11 54	Sol,Sp	Alum	Fab	Fx	70	Sh 6.00x6	Sh,Mech	Ol	SkWh	ST,Wl,Fab
1,020	1,650	32'	24'	7'	163 0	16 2	2 5	2 0	12 0	13 5	Sp,Box	W	Fab	Fa	70	Aut 20x9-4	Aut	Sc	Wh	ST,Wl,Fab
[illegible]	[illegible]	32'	24'	7'	163 0	16 2	2 5	7 0	12 0	[illegible]	Sp,Box	W	Fab	Fa	[illegible]	Aut 20x9-4	Aut	Sc	Wh	ST Wl,Fab
570	1,350	35	20'	6'	169 0	23 0	5 28	6 16	15 2	10 0	Lam,Sp	Sp	Fab		72	Firestone	Sh,Mech	Ol,Sp	Oleo	
800	1,350	35	20'	6'	169 0	19 0	4 5	6 94	15 2	10 0	Lam,Sp	Sp	Fab		21	Firestone	Sh,Mech	Ol	Ol	
990	1,500	35 6"	25'	8'	185 0	19 2	4 66	6 2	14 66	10 64	Sp	Narf	Fab	Re	58	Ha,800x4	Hyd,Pal	Ha	Sk	D,525
1,050	1,250	34'2"	21'5"	6'3"	162 0	14 0	6 5	5 0	16 07	9 36	Spr,Plank	S,Ply	Ply	Bo	8'9"	8.00x4	Pal,Hyd	Ol	Wh	ST Fab
750	1,305	27'	17'8"	5'6"	120 0	9 22	3 77	3 57	12 40	5 26	Lam,Sp	W	Fab	Bo	79	Ha5.00x4	Ha,ETHyd	Ol,Spr Own	WhSpr	Semi Mo
716	1,175	30	20'2"	5'11"	142 6	16 8	3 3	6 0	10 2	9 4	Dl	D	D Fab	Ty	84	Ha7.00x4	HydGa	Ol,Eros		D,Mo
1,249	2,450	36	27'6"	7'9"	200 0	16 6	6 9	14 5	26 2	15 2	Sol,Sp	D	Ply	Fx	115		Hy	Ol	Wh	ST,Wl,Fab
1,090	1,200	24	16'5"	6'10"	162 4	17 4	—	—	12 84	9 3	Sol,Sp	S,D	Fab	Ty	70	Shn,Lp6.00x6	Sh,Mech	O,Spr	—	D,Mo
1,090	1,700	24	16'3"	6'10"	169 4	17 4			12 84	9 5	Sol,Sp	S,D	Fab	Ty	70	Shr,Lp6.00x6	Sh Mech	O,Spr		D,Mo
1,800	2,456	35'9¾"	23'4"	7'3"	185 0	13 02	12 58	10 9	21 2	17 12	D	Ma	D	Re	91	21" Sl,Gen	Hyd	Arp,Ol	Wh	AD,Rx
1,950	2,600	35'9¾"	23'9"	7'9"	185 0	13 02	12 53	10 9	21 2	17 17	D	Ma	D	Re	91	21" Sl,Gen	Hyd	Acp,Ol	Wh	AD,Ma
1,350	2,000	34	[illegible]	7'3"	129 5	20 7	9 2	6 2	10 2	11 9	Pm,Sp		Ply	Fx	113½	Gen 8.00x5	Gen,Hyd	Spr,Hyd	Wh	S Wl,Fab
	1,150	35 6"	23'6"	7'5"	175 8		4 7	7 0	13 0	9 0	Spr	Mo	Fab	Fx		Shn, 6.00x6	Sh,Hyd	Ol In,St	6.00x2 Strbla	
700	1,200	35'6"	23'2"	7'5"	173 0		4 7	7 0	13 0	9 0	Spr	Me	Fab	Fx		Shn,6.00x6	Sh,Hyd	Ol,In,St	6.00x2 Strbla	
700	1,200	35'6"	23'2"	7'5"	173 0		4 7	7 0	13 0	0 0	Spr	Ma	Fab	Fx	—	Shn 6.00x6	Sh,Hyd	Ol,In,St	6.00x2 Strbla	
700	1,275	36	21'9"	6'8"	185 0	16 0	6 8	6 8	20 0	12 5	Lam,Sp	Sp	Fab	Fx	73	Air 16x7 3	Mech	Sc	WA	Sa,G,Ply
1,630	2,250	40'	28'10"	10'3"	55 2		12 0	3 2	22 0		ST	Ply	Fl,Fab	Fx	114 5	7.00x5 Ga	Mech,Ha	Ol,Ba	Wh	ST Wl,Fab
1,600	2,140	40	28'10"	10'3"	55 2		12 0	3 2	22 0		ST	Ply		Fx	114 5	7.00x5 Ga	Mech,Ha	Ol,Ba	Wh	ST Wl,Fab
650	1,200	35	20'	5'10½"	140 0	15 0	4 9	5 65	15 0	8 25	Dl	D	Fab	Ol	76	Fi 16-6	Sh,Mech	Ol,Own	Spr	AD MO
791	1,260	35	21'4"	8'	140 0	15 0	4 9	5 65	15 0	8 75	Dl	D	Fab							AD Mo
650	1,200	35	20'	5'10½"	140 0	13 0	4 9	5 65	13 0	8 75	Dl	D	Fab	Ol	76	Fi 16-6	Sh,Mech	Ol,Own	Spr	AD Mo
722	1,200	35	20'	5'10½"	140 0	15 0	4 9	5 65	15 0	8 75	Dl	D	Fab	Ol	76	Fi 16-6	Sh,Mech	Ol,Own	Wb	AD Mo
1,020	1,610	32	20'6"	6'11"	157 2	15 5	4 1	5 8	10 6	9 2	Sol,Sp	W	Fab	Fx	87 5	GoAirWheels	Go	Sc	Wh	ST Wl,Fab
925	1,610	32	20'6"	6'11"	132 1	15 5	4 1	5 8	10 6	9 2	Sol,Sp	W	Fab	Fx	87 5	EH 6.50x10	EH Mech	Sc	Wh	ST Wl,Fab
1,045	1,630	23 2½"	20'5"	6'6"	94 0	16 0	3 5	5 0	10 0	7 0	Sol,Sp	W	Fab	Fx	25	EH 6.50x10	EH Mech	Sc	Wh	ST Wl,Fab
610	1,150	30	21'7"	6'8"	135 0	14 0	5 1	6 8	15 5	8 8	AD	D	Fab	Fx	84	Fi 6.00x6	Sh,Hyd	Sc	Wh	Mo AD
650	1,229	30	21'0"	6'6"	135 0	14 0	5 1	6 8	13 5	8 8	AD	D	Fab	Re	77	Fi 6.00x6	Sh,Hyd	Sc	Wh	Mo,AD
1,475	2,176	32'6"	24'	7'8"	168 0						AD	AD	AD	Fx	80	Aut 6.50x10	He,Hyd	Air Ki	Pn	Stf,Skin
574	1,000	35'2½"	22'5"	6'8"	176 5	19 2	4 02	6 55	14 65	10 64	Sol,Sp	D	Fab	Fx	71	Ha 8.00x4	Hyd Pal	Ha	Sk	ST,Wl,Fab
600	1,100	35 2½"	22'6½"	6'8"	178 5	19 2	4 02	6 55	14 65	10 64	Sol Sp	D	Fab	Fx	71	Ha 8.00x4	Hyd Pal	Ha	Sk	ST,Wl,Fab
600	1,100	35 2½"	22'6½"	6'8"	178 5	19 2	4 02	6 55	14 65	10 64	Sol,Sp	D	Fab	Fx	71	Ha 8.00x4	Hyd Pal	Ra	Sk	ST,Wl Fab
590	1,100	35 2½"	22'3"	6'8"	176 5	19 2	4 02	6 55	14 65	10 64	Sol,Sp	D	Fab	Fx	71	Ha 8.00x4	Hyd Pal	Ru	Sk	ST,Wl,Fab
590	1,100	35 2½"	22'3"	6'8"	178 5	19 2	4 02	6 55	14 65	10 64	Sol,Sp	D	Fab	Fx	71	Ha 8.00x4	Hyd,Pal	Ba	Sk	ST,Wl,Fab
800	1,400	36'2"	22'6"	6'10"	183 0	19 2	4 66	6 76	14 66	10 64	D	D	Fab	Fx	77	Ha 8.00x4	Hyd Pal	Ol	FuSw Wh	ST,Wl,Fab
800	1,300	36'2"	[illegible]	6'10"	183 0	19 2	4 66	6 76	14 66	10 64	Sol,Sp	D	Fab	Fx	77	Ha 8.00x4	Hyd,Pal	Ol	FuSw Wh	ST,Wl,Fab
750	1,450	35 5½"	[illegible]	6'10"	179 0	19 2	4 00	6 26	14 65	10 64	Sol,Sp	D	Fab	Fx	74½	Ha 8.00x4	Hyd,Pal	Ru	FuSw	ST,Wl,Fab
750	1,450	35 5½"	22'6"	6'10"	179 0	19 2	4 02	6 2	14 65	10 64	Sol,Sp	D	Fab	Fx	74½	Ha 8.00x4	Hyd,Pal	Ra	FuSw	ST Wl,Fab
590	1,100	35 2½"	22 5"	6'8"	128 5	19 2	4 02	6 55	14 65	10 64	Sol,Sp	D	Fab	Fx	71	Ha 8.00x4	Hyd,Pal	Bo	Sk	ST,Wl,Fab
1,475	2,050	43 0"	20 5"	10'3½"	145.2		74 4	5 7	12 4	5 4	ST	Ply	Ply	Ol	84	Bz 7.0x4	Sh,Hyd	Bz,Pn,Ol	Pn,Ol	
625	1,100	34'9"	22 2½"	7	168 8	19 1	6 38	6 84	10 57	11 0	Sp	Sp	Fab	18	69	Shnn 6.00x6	Mech,Sh	17	Spr	Wl,ST,Fab
675	1,160	34'9"	22 2½"	7	166 8	19 1	6 38	6 84	10 57	11 0	Sp	Sp	Fab	18	69	Shnn 6.00x6	Mech,Sh	17	Spr	Wl,ST,Fab
625	1,160	34'9"	22 2½"	7'	166 8	19 1	6 38	6 94	10 57	11 0	Sp	Sp	Fab	18	69	Shnn 6.00x6	Mech,Sh	17	Spr	Wl,ST,Fab
675	1,200	34'9"	22'7½"	7	168 8	19 1	6 35	6 84	10 57	11 0	Sp		Fab	18	69	Shnn 6.00x6	Mech,Sh	17	Spr	Wl,ST,Fab
620	1,326	32'	22 1½"	6'8½"	147 0	17 6	6 5	7 3	13 7	9 55	Sp		Fab	18	69 5	Shnn 6.00x6	Mech,Sh	RuR	Spr	Wl,ST,Fab
826	1,326	32	20'3"	6 8½"	142 0	12 1	5 16	6 33	15 2	9 55	Sp	Sp	Fab	18	69 5	Shnn 6.00x6	Mech,Sh	RuR	Spr	Wl,ST,Fab
850	1,460	35'	22'3"	6'9"	166 0	19 75	5 12	6 92	15 04	12 12	Sol Sp	Sp	Fab	Fx	72	Go 18x8-3	Go Mech	Hyd	Sk	ST Wl,Fab
830	1,460	35'	22'3"	6'9"	166 0	19 75	5 12	6 92	15 04	12 12	Sol,Sp	Sp	Fab	Fx	72	Go 18x8-3	Go Mech	Hyd	Wh	ST Wl Fab
861	1,460	35	22 3"	6'9"	166 0	19 75	5 17	6 92	15 04	12 12	Sol,Sp	Sp	Fab	Fx	72	Go 18x8-3	Go Mech	Hyd	Sk	ST Wl,Fab
1,010	1,207	32	22'10"	6'10 ⅝"	145 2	15 13	10 5	6 0	15 66	9 0	Sol,Sp	Sp	Fab	Fx	72	Go 18x8-3	Go,Mech	Hyd	Wh	ST Wl,Fab
1,030	1,635	34 1⅝"	21'6"	7'4"	161 8	15 15	8 45	5 25	15 94	11 56	Sol,Sp	Sp	Fab	Fx	69	Go 18x8-3	Go,Mech	Hyd	Wh	ST Wl,Fab
1,070	1,734	34 1⅝"	21'6"	7'4"	161 6	13 13	8 45	5 25	13 94	11 56	Sol,Sp	Sp	Fab	Fx	69	Go 18x8-3	Go,Mech	Hyd	Wh	ST Wl,Fab
1,120	1,800	34 1⅝"	21 6"	7 4"	161 8	15 13	12 0	5 75	13 94	11 56	Sol,Sp	Sp	Fab	Fx	80	Go 18x8-3	Go,Mech	Hyd	Wh	ST Wl,Fab
760	1,350	34	21'9"	6'7"	164 6	8 41	8 94	5 91	14 76	10 88	Sol,Sp	Sp	Fab	Fx	22	Sh	Sh Mech	Hyd	WA	ST Wl,Fab
760	1,350	36	21'9"	6'7"	164 6	[illegible]	8.94	5 91	14 76	10 88	Sol,Sp	Sp	Fab	Fx	72	Sh	Sh Mech	Hyd	Wh	ST Wl,Fab
810	1,350	34	21'9"	6'7"	164 6	8 42	6 94	5 91	14 76	10 88	Sol,Sp	Sp	Fab	Fx	22	Sh	Sh Mech	Hyd	WA	ST Wl,Fab
815	1,350	34	21'9"	6'7"	164 6	8 42	6 94	5 91	14 76	10 88	Sol,Sp	Sp	Fab	Fx	22	Sh	Sh,Mech	Hyd	WA	ST Wl,Fab
51[illegible]	940	30	20'	7'	147 0	13 5	3 85	5 67	15 12	10 32	Sp	Sp	Fab	Fx	55	16x7-3 or 7-4		Air Whl	Sk	Wl ST Fab
5[illegible]	940	30	20'	7	147 0	13 5	3 85	5 67	15 12	10 32	Sp	Sp	Fab	Fx	55	16x7 or 7-4		Air Whl	Whl	Wl ST,Fab
1,345	2,350	37 6"	25'4"	6 10"	202 0	16 2	5 1	6 6	14 5	11 5	S,Mo	D	AD Fab	Fx	96⅝	Go 18x8-3	Go,Mech	Ol	Wh	D Mo
1,031	1,600	27 11"	21'5⅝"	6'11"	124 0	12 0	4 7	7 2	12 0	10 0	Sol,Sp	D	Fab	Fx	66	Go 18x8-5	Go,Mech	Ol	Wh	D,Mo
1,035	1,600	27 11"	21 5⅝"	6'11"	126 0	12 0	4 7	2 2	12 0	10 0	Sol,Sp	D	Fab	Fx	66	Go 19x8-5	Go,Mech	Ol	Wh	D,Mo
1,300	1,900	35 10"	25'	7'8"	187 0	19 6	2 6	2 2	19 2	13 6	Lam,Sp		Fab	Fx	96	Aut. 10x6.5	Aut	Ol,Pas	Wh	ST Wl Fab,D
2,070	2,790	34 1"	25'2"	9'6"	304 5	25 22	6 79	10 22	19 28	20 62	Sp,I	Sp,Ply	Fab	Fx	90 16	Sl 24	Hyd	Hyd	Hyd	T,Al,Fab
2,070	2,790	34 1"	25'2"	9'6"	304 5	25 22	6 79	10 22	19 28	20 62	Sp,I	Sp,Ply	Fab	Fx	90 16	Sl 24	Hyd	Hyd	Hyd	T,Al,Fab
2,070	2,790	34'1"	25'2"	9 6"	304 5	25 [illegible]	6.79	10 22	19 28	20 62	Sp,I	Sp,Ply	Fab	Fx	90 16	Sl 24	Hyd	Hyd	Hyd	T,Al,Fab
610	1,146	30	22'5½"	6'5½"	137 0	14 58	4 02	6 27	11 94	11 22	Sol,Sp	W	Fab		67	6.00x6	Sh	SC	SprWh	WLS
7,055	2,770	33 10"	26 3"	9'5"	297 0						D	DT	Fab	43		Sl 24	Ex,Hyd	Aer	Aer	Mn
1,39[illegible]	2,012	30'0"	24'9"	2'10"	157 0						SMB	D	Fab	43		2.00x5	Gen Hyd	44	44	Mo & T,Tra
954	1,675	34	21'8"	6'6"	155 0	18 02	8 41	6 76	14 20	10 75	Sol,Sp	Rd	Fab	Fx	84	Ha 6.00x6	Gr Hyd	Spr,Ol	Wh	ST Wl,Fab
1,018	1,625	34	21'8"	6'6"	155 0	18 02	8 41	6 76	14 20	10 75	Sol,Sp	Rd	Fab	Fx	84	Ha 6.00x6	Gr Hyd	Spr,Ol	Wh	ST Wl,Fab
825	1,550	27	22'	7'4"	120 0	16 0	5.5	2 6	12.1	8 1	Pl,Sp	Ply	Ply	Rx	88	6.00x6	Ha,Hyd	Hyd,Spr	WA	
661	1,150	36	22'	6'6"	169 0	—					Sol,Sp	Mo	Fab					Sc	Wh	ST Wl,Fab
632	1,150	36	22	6'10"	169 0	—					Sol Sp	Mo	Fab					Sc	Sk	ST Wl Fab
700	1,200	36'	22'	6 10"	169 0						Sol Sp	Mc	Fab						Wh	ST Wl Fab
700	1,200	36'	22'	6 10"	169 0						Sol,Sp	Mo	Fab						Wh	ST,Wl,Fab
704	1,200	36	22'	6 10"	169 0						Sol,Sp	Mo	Fab						WA	ST Wl Fab
1,901	2,450	36	25'3½"	10'6"	182 75	20 20	7.15	9 33	17 62	16 66	Box	Tra		Fz	132	7.00x8 Aer	Sh,Hyd	Sz,Ol	Hyd	W,Sp
1,70[illegible]	2,400	36	25'3½"	10 6"	182 25	20 25	12 1	9 33	24 66	16 66	Box	Tra		Fx	109½	7.00x8 Aer	Sh,Hyd	Sz,Ol	Hyd	W,Sp
2,564	2,650	30'	23'1"	8'6"	243 6						Sp	Sp	Fab		101	8.50x10	Ha Hyd	Waco,Ol	Wh	
1,579	2,550	30'	23'1"	8'6"	243 6						Sp	Sp	Fab		101	8.50x10	Ha Hyd	Waco,Ol	Wh	
2,593	2,650	30'	23'1"	8'6"	243 6						Sp	Sp	Fab		101	8.50x10	Ha Hyd	Waco,Ol	Wh	
1,302	1,916	34 5½"	24'6½"	7 2½"	195 0						Sp	W	Fab	Fx					Wh	
528	950	34'4"	20'6"	7'	138 0	18 92	11 2	9 13	14 4	11 2	Sp,I	Bass	Fab	Fx	56½	Welch 16x7	None	Solid	Wh	Wl Fab
498	954	34 4"	21 1"	7	136 0	18 92	11 2	9 15	14 4	11 2	Sp,I	Bass	Fab	Fx	56½	Welch 16x7	None	Solid	Wh	Wl Fab
506	950	36'	20'9"	7'	150 0	18 92	11 1	9 13	14 4	11 2	Sp,L	Bass	Fab		56½	Welch 16x7	None	Solid	Steer	T Wl,Fab
538	950	34 4"	[illegible]	7'	140 0	18 92	19 5	9 98	14 4	11 2	Sp,I	Bass-	Fab		56½	Welch 16x7	None	Solid	WA	T Wl,Fab
525	950	34 4"	20'6"	7'	148 0	18 92	11 2	9 15	14 4	11 2	Sp,L	Bass-	Fab	Fx	56½	Welch 16x7	None	Solid	Wh	Wl Fab
540	1,000	34'4"	20'6"	7	148 0	18 92	19 2	9 08	14 4	11 2	Sp,I	Bass	Fab		56½	Welch 16x7	None	Solid	Steer	T Wl,Fab
765	1,400	30'	20	6'8"	146 0	12 0	5 2	6 5	10 7	17 32	Sol,Sp	Sp	Ma,Fab Ply		96	Sh 6.00x6			WA	
	2,240	31'	24'5½"	8'9"	242 5	27.6					Sp	Sp	Fab	Fz		6.50x10	Go,Hyd	Ol	W	

Key to Abbreviations

(Footnotes on bottom of table on pages 109-110)

*	—Approved on floats
A	—Amphibian
Arp	—Aircraft Prod
AD	—Alclad
Aer	—Aerol
Al	—Aluminum
Alu	—Alliance
Apl	—Applied for
Ar	—Aeronca
Aut	—Autofan
Aw	—Air Wheels
B	—Biplane
Bo	—Bolted
Box	—Box spar
Bn	—Bendix
C	—Closed
CG	—Coast Guard
Con	—Continental
Crit	—Critical
Cy	—Cyclone
Cyy	—Two-row Cyclone
D	—Aluminum Alloy
E.H.	—Ebert Hatch
F	—Flying Boat
Fab	—Fabric
Fl	—Floats
Fo	—Ford
Fr	—Franklin
Fx	—Fixed
G	—Glued
Gen	—General
Gs	—Goodyear
Ga	—Goodrich
Gy	—Autogiro
Ha	—Hayes
Hyd	—Hydraulic
I	—"I" section
Id	—Inverted
Ja	—Jacobs
K	—Kinner
Kr	—Ken Royce
L	—Landplane
Lam	—Lambert
LeB	—LeBlond
Len	—Lenape
Lmd	—Laminated
Lp	—Low Pressure
Ly	—Lycoming
M	—Monoplane
Me	—Metal
Mech	—Mechanical
Men	—Menasco
Mil	—Military
Mo	—Monocoque
Mu	—Multicellular
O	—Open
Ol	—Oleo
Op	—Optional
Pal	—Palmer
Ply	—Plywood
Pn	—Pneumatic
Pob	—Pobjoy
Pwh	—P & W Hornet
Pwj	—P & W Wasp, Jr
Pwwj	—P & W Twin Wasp, Jr
Pww	—P & W Wasp
Pwww	—P & W Twin Wasp
Q	—Sesquiplane
Ran	—Ranger
Re	—Retractable
Ri	—Lord Instrument Mounting
Rm	—Lord Engine Mounting
RW	—Retractable Wheel
Ra	—Routed
Rx	—[illegible]
Rv	—Riveted
S	—Steel
Sc	—Shock cord
Se	—Security
Sk	—Skid
Sl	—Streamline
S.L.	—Sea Level
Sh	—Shinn
S.M.B.	—Single metal box
Sol	—Solid
Sp	—Spruce
Spr	—Spring
SS	—Stainless Steel
Stu	—Studebaker
Sx	—[illegible]
T	—Tubing
Tra	—Truss
Ty	—Tricycle
W	—Wood
War	—Warner
Wal	—Welch
Wh	—Wheel
Wl	—Welded
Wr	—Wright
Ww	—Whirlwind

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4–5 Seats

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Beech Aircraft Corp	D-17L	638		CRL[a]	5	Wr, Ww	450	S.L.	100	670	23 0	99	211	S.L.	202	9,700	50	1,400	23,000
Beech Aircraft Corp	D-17A	713		CRL[a]	5	Ww, Ww	320	S.L.	100	630	17 0	99	178	S.L.	176	9,600	50	1,100	15,500
Beech Aircraft Corp	D-17S	649		CRL[a]	5	Pw	450	S.L.	100	670	23 0	99	211	S.L.	202	9,700	50	1,500	25,000
Beech Aircraft Corp	E-17B	641		CRL[a]	5	Sh	285	S.L.	75	600	17 0	93	185	S.L.	177	7,200	45	1,200	18,000
Beech Aircraft Corp	F-17D	689		CRL[a]	5	Jn	330	3,70	75	600	17 0	93	190	S.L.	182	10,000		1,300	18,000
Comm Aircraft Co	C-145	701		CML[a]	5	War,	145	S.L.	80	525	9 5	84	162	S.L.	151	5,200	40	1,000	18,000
Comm Aircraft Co	C-165	701		CML[a]	5	War, Ri	165	S.L.	80	485	10 0	84	169	S.L.	157	6,700	40	1,175	19,500
Cessna Aircraft Co	T 50 Twin	722		CML[a]	5	Jn, Ro	450	S.L.	11 126	750	26 0	93	195	S.L.	191	7,500	55	1,525	22,000
Colgate-Larsen Aircraft Company	Experimental CL-15			A [a]	4	Hen	200	S.L.	55	540		96	140	S.L.	125	S.L.	50	800	14,000
Fairchild Aircraft	F-24 W-40	707	—	CML[a]	4	War[m]	145	S.L.	60	720	9 5	86	135	S.L.	122	7,000	50	720	15,700
Fleetwings, Inc	*F-5*			*CMA*	4	*Je*[m]	285	S.L.	70	560	12 0	107	160	S.L.	144	S.L.	61	950	15,000
Fleetwings, Inc	F-50	680		J	4	Je	300	S.L.	70	516	18 0	102	150	S.L.	135		58	914	14,300
Fleetwings, Inc	F-50	680			4	Je	300	S.L.	70	516	18 0	102	150	S.L.	135	6,000	59	1,070	14,300
Grumman Aircraft Engr Corp	*Widgeon*			*CMA*	5	*2 Ben*	400	S.L.	100	775	20 0	87			139	7,000	61	870	15,000
Harlow Aircraft Co	PJC-2	659		CLM	4	War	145	S.L.	34	800	9 0	84	140	S.L.	135	Max	52	850	12,000
Howard Aircraft Corp	*DGA 15P*		*On req.*	*CRL*	5	*Pw, Rm, Ri*	400	5 000	121	970	24 0	99	186	S.L.	197	9,000	60	1,560	21,500
Howard Aircraft Corp	*DGA 15J*		*On req.*	*CML*	5	*Ja, Rm, Ri*	350	3 760	118	1,100	18 5	99	178	S.L.	169	6,000	60	1,900	15,500
Howard Aircraft Corp	DGA 15W	717	On req.	CML	5	Wr Rm, Ri	320		118	1,025	18 5	99			175	9,500	60	1,550	17,500
Menasco Corp	*Type Menasco-A*			*CML*	4–5	*Rem*	180	S.L.	70	912	10 0	78	150	S.L.	135	6,000	48	560	12,000
Ong Aircraft Corp	*M-33W*		*6 465*	*CML*	4	*War*	145	S.L.	40	540	9 5	90	136	S.L.	135	S.L.	50	900	17,000
Ong Aircraft Corp	*M-32*		—	*CML*	4	*Men*	150	3,000	40	572	10 0	84	139	3,000	139	3,000	50	1,000	19,000
Ong Aircraft Corp	*M-33W1*			*CML*	4	*War*	165	S.L.	40	590	10 0	90	164	S.L.	141	S.L.	50	1,000	18,000
Stinson Aircraft	*SR 10J*			*CML*	4–5	*Ly, Ren*	285	S.L.	100	835	18 0	107			155	9,000	60	1,040	15,000
Stinson Aircraft	SR 10K	679	—	CML[a]	4–5	W, Ww Rm	420	1 800	100	610	27 0	102	177 5	5,500	160	5,500	62	1,450	19,400
Stinson Aircraft	*HRE*			*CRL*	5	*Ja, Rm, Ren*	285	S.L.	125	1,000	18 0				168	S.L.	58	680	14,000
Waco Aircraft Co	ARE		*15 595*	CML	5	Ja, Ri, Rm	300	3 700	125	1,000	17 4		160	S.L.	124	8,000	60	825	16,400
Waco Aircraft Co	SRE	714	12,800	CRL	5	Pw, Ri, Rm	400	5 000	125	846	22 7		200	S.L.	195	9,500	60	1,550	23,500
Waco Aircraft Co	*WRE*		*12,200*	*CRL*	5	*Pr, Ri, Rm*	420	1,400	125	830	25 6		204	S.L.	200	9,500	60	1,600	24,000
Waco Aircraft Co	YKS	*%26*	7,110	CRL	5	Ja, Ri	225	S.L.	70	516	15 5		144	S.L.	135	6–10,000	52	700	12,500
Waco Aircraft Co	ZKS	*%36*	7,890	CRL	5	Ja, Ri	285	S.L.	70	504	17 0		157	S.L.	144	6–10,000	52	850	14,000
Waco Aircraft Co	YKS	*%48*	7,670	CRL	5	Con, Ri	260	S.L.	70	492	16 5		145	S.L.	136	6–10,000	52	800	15,000
Waco Aircraft Co	AYN	677	12 800	CML	5	Ja, Ri	300	3,200	95	625	17 4		161	S.L.	151	8 500	56	950	14,200
White Aircraft Corp	New Standard D-25	108		CLM	5	Wr Ww	285	S.L.	62			100	125	S.L.	95	S.L.	40	800	12,000

6 or more Seats

Air Transport Mfg. Co., Ltd	T-6	223		CML	6[h]	K	300	S.L.	85	450	18 0	78	140	1 000	123	1,000	47	1,100	18,000
Air Transport Mfg. Co., Ltd	*B-6*			*CML*	6	*2Wr, Ww*	540	S.L.	140	750	35 0	100	169	S.L.	160	S.L.	58	1,400	22,000
Beech Aircraft Corp	18-S	6		CML	6	2Wr, Ww	540	S.L.	140	1,200	35 0	99	210	S.L.	200	10,000	59	1,400	20,000
Beech Aircraft Corp	18-S	7		CML	6	2Pw	900	S.L.	720	1,100	43 0	99	230	S.L.	220	12,000	61	1,850	22,000
Beltman	Aircruiser Cargo	565		CQL	15	Wr, Cy	715	3,900	300	610	42 0	150	165	7 000	155	12,000	64	700	16,000
Beltman	Sr. Skyrocket	565		CML	6	Pww	590	5 650	200	600	36 5	108	190	7,000	180	12,000	64	2,240	25,000
Beltman	Sr. Pacemaker Tr	578		CML	6	Wr, W	450	3,000	200	800	25 2	108	164	S.L.	145	5,000	64	700	12,000
Boeing Aircraft C	314	704		CMF	36	4Ww, Cyy[m]	5,000	S.L.	4,200	3,100			190		175	10,000		650	14,000
Boeing Aircraft Co	307 Stratoliner	736		CML	36	4Ww, Cy	4,400	S.L.	1,200	1,675	150	138	256		222	15,000	70	1,200	24,400
Central Aircraft Corp	*U-14*			*CML*	6	*2Pw, Pwh*	1,500	7,000	300	600	100		225	6,000	185	8,000	63	1,250	22,000
Central Aircraft Corp	*CP-14*			*CML*	3–5	*Wr*	2,700	6,000	87	1,440	207 0	138	247	6,000	206	6,000	65	1,092	22,000
Consolidated Aircraft Corp	28 Com. Amphibian			CMA	6	2 Pww	2,700	7,500		2,000			196	5,000	182	10,000	68		18,500
Consolidated Aircraft Corp	28 Com. Flying Boat			CMF	6	2 Pww	2,700	7,500		2,000			196	5,000	182	10,000	68		18,500
Consolidated Aircraft Corp	29 Com. Flying Boat			CMF	6	2 Pww	2,700	7,500		3,000			226	5,000	207	10,000	72		18,000
Consolidated Aircraft Corp	31 Com. Flying Boat			CMF	12	2Pw	Performance and technical information not released.												
Consolidated Aircraft Corp	32 Landplane Transport			CML	12	2Pw	Performance and technical information not released.												
St. Louis Airplane Div., Curtiss-Wright	*(Curtiss-Wright Transport)*			*CML*	6	*2Wr, Cy, Double Row*	1,500	7,000	1,000	1,570	140 0	180	262	13,000	227	10,000	73	1,500	26,900
St. Louis Airplane Div., Curtiss-Wright	*20-C Com. Cargo Tranny.*			*CML*	6	*2Wr, Cy, Double Row*	1,500	7,000	1,000	1,570	140 0	180	262	13,000	227	10,000	73	1,500	26,900
Douglas Aircraft Co., Inc	DC-3	648		CML	21	2Ww, Cy	2,800	6,900	822	2,125	10	138	230	7,900	198	11,400	67	1,070	21,900
Douglas Aircraft Co., Inc	DC-3	667		CML	21	2Pww	2,100	7,500	822	2,125	10	138	230	8,500	209	15,000	67	1,130	23,200
Douglas Aircraft Co., Inc	*DC-4*			*CML*	4	*4Pw*	4,400	6,300	1,700	2,500	221	150	265	16,900	242	15,200	78	1,350	26,000
Grumman Aircraft Engineering Corp	G-21A	954		CMA	6	2Wsp, Rl	800	5 000	220	1,000	51 0	100	201	5,000	178	6,000	63	1,300	22,000
Lockheed Aircraft Corp	10-10 (S1C3-6)	723		CLM	12	2Pwsw	2,100	7,500	644	1,500	93	126	253	15,000	230	15,000	70	1,650	23,500
Lockheed Aircraft Corp	10-14 (S4C4G)	723		CLM	12	2Pwsw	2,100	15 400	644	1,500	93	126	275	16,700	246	19,000	70	1,850	27,000
Lockheed Aircraft Corp	10-40 (10ZA)	723		CLM	12	2Wr, Cy	1,800	6 700	644	1,085	90 3	126	250	7,500	220	12,000	70	1,300	21,800
Lockheed Aircraft Corp	*10-51 (207A)*			*CLM*	12	*2Wr, Cy*	2,000	6,000	644	620	93 0	126	259	7,500	230	12,000	70	1,500	24,500
Lockheed Aircraft Corp	*10-56 (207A-3)*			*CLM*	12	*2Wr, Cy*	2,000	14 000	644	620	93 0	126	271	15 500	248	19,000	70	1,730	26,000
Lockheed Aircraft Corp	*144-14 (S4C4-6)*			*CLM*	40	*2Pwsw*	4,200	15 400	1,200	1,612	191 0	133	294	16,700	258	19,000	82	1,465	24,500
Lockheed Aircraft Corp	*144-55*			*CLM*	40	*4Wr, Cy*	4,400	15 500	1,400	2,716	216 0	133	294	16,600	258	12,000	82	1,695	24,500
Lockheed Aircraft Corp	Electra 10A	551		CML	12	2Pwj[m]	600	5 000	194	810	52 0	126	202	5 000	190	9 000	64	1,000	21 150
Lockheed Aircraft Corp	Electra 10E	590		CML	12	2Pwr[m]	400	18 500	250	850	71 0	108	217	10 500	202	9 600	63	1,100	25 700
Lockheed Aircraft Corp	Model 12A	811		CML	8	2Pwj[m]	900	5 000	200	950	52 0	108	225	5 000	212	9,600	65	1,360	22,300
Glenn L. Martin Co	156-C	597		CMF	53	2Ww, Cy[m]	3,800	5 800	2,940	2,410		144	192	5 800	160	10,000	67		
Vought-Sikorsky Div., United Aircraft	S-42-B	592		CMF	57	4Pwh[m]	3,000	7,000	1,240	1,200	168 0	136	188	7,000	163	7,000	65	800	15,000
Vought-Sikorsky Div., United Aircraft	S-43	593		CMA	18	2Pwh[m]	1,500	7,000	400	775	84 0	138	190	7,000	166	2,000	65	1,000	18,000
Vought-Sikorsky Div., United Aircraft	S-43-B	593		CMA	18	2Pwh[m]	1,500	7,000	400	775	84 0	138	190	7,000	166	7,000	65	1,000	18,000
Vought-Sikorsky Div., United Aircraft	*VS-44-A*			*CMF*	32	*4Pwh*	4,000	7,500	3,000	3,000		159			175	7,500	65	600	17,000

Key to Abbreviations Used in All Aircraft Specification Tables

* — Approved as Basic
A — Amphibian
Aep — Aircraft Proof
AD — Abiad
Aer — Aerol
Al — Aluminum
Ale — Alfinol
Apl — Applied Ice
Ar — Arrowac
Aut — Autofin
Aw — Air Wheels
B — Biplane
Bo — Bolted
Box — Box spar
Bx — Bendix
C — Closed
CG — Coast Guard
Con — Continental
Cri — Criterion
Cy — Cyclone
Cyy — Two row Cyclone
D — Duralumin Alloy
E.H. — Ebert Hetish
F — Flying Boat
Fab — Fabric
Fl — Floats
Fo — Ford
Fr — Franklin
Fx — Fleet
G — Glenn
Gm — General
Go — Goodyear
Gr — Goodrich
Gy — Autogiro
Ha — Hamilton
Hyd — Hydraulic
I — I section
Id — Inverted
Je — Jacobs
K — K mon
Kr — Ace Keyes
L — Landplane
Lam — Lambert
LeH — LeBlond
Lex — Lexaps
Lmd — Laminated
Lp — Low Pressure
Ly — Lycoming
M — Menasco
Me — Metal
Mech — Mechanical
Men — Menasco
Mil — Military
Mu — Monocoque
Mu — Multicellular
O — Open
Ol — Olco
Op — Optional
Pal — Palmer
Ply — Plywood
Pn — Panamatic
Poh — Pobjoy
Pwh — P & W Hornet
Pwj — P & W Wasp, Jr
Pwsw — P & W Twin Wasp, Jr
Pww — P & W Wasp
Pwww — P & W Twin Wasp
Q — Sesquiplane
Ran — Ranger
Re — Retractable
Ri — Lord Instrument Mounting
Rm — Lord Engine Mounting
RW — Retractable Wheel
Ro — Rotated
Ru — Ranee
Ri — Riveted
S — Steel
Se — Shock cord
Se — Security
Sk — Skid
Sl — Streamline
S.L. — Sea Level
Sh — Shinn
S.M.B. — Single metal box
Sol — Solid
Sp — Spruce
Spi — Spring
SS — Stainless Steel
St — Studebaker
Su — Sunky
T — Tubing
Tm — Truss
Ty — Tricycle
W — Wood
War — Warren
Wel — Welch
Wh — Wheel
Wl — Welded
Wr — Wright
Ww — Whirlwind

...ft Specifications (Cont'd)

...sponsibility for the figures given

Weights				Dimensions			Areas — (Sq. Ft.)						Wings			Landing Gear						Fuselage or Hull
Wing loading (lb. per sq. ft.)	Power loading (lb. per hp.)	Weight empty	Gross weight (lb.)	Span	Length overall	Height overall	Wing (including ailerons)	Ailerons (total)	Flt.	Rudder	Stabilizer	Elevators (total)	Struts	Bits	Covering material	Type	Tread (in.)	Wheel type and size	Brakes (type and make)	Landing gear shock unit (type and make)	Tail unit	
14 17	10 0	2,622	4,250	32'0"	26'10¾"	8'	296 5	23 75	6 56	8 7	24 5	16 6	Str.Sel	Sp	Fab	Re	86	Go 7.50x10	Hyd	Spr.Ol	Rw	ST.Wl.Fab
14 17	13 1	2,517	4,250	32'	26'7"	8'	296 5	23 75	6 56	8 7	24 5	16 6	Str.Sel	Sp	Fab	Re	86	Go 7.50x10	Hyd	Spr.Ol	Rw	ST.Wl.Fab
14 17	11 5	2,689	4,250	32'	25'11½"	8'	296 5	23 75	6 56	8 7	24 5	16 6	Str.Sel	Sp	Fab	Re	86	Go 7.50x10	Hyd	Spr.Ol	Rw	ST.Wl.Fab
14 9	11 7	2,163	3,500	32'	25'11"	8'	296 5	23 75	5 54	8 7	23 7	15 1	Str.Sel	Sp	Fab	Re	86	Go 7.50x10	Hyd	Spr.Ol	Rw	ST.Wl.Fab
13 5	9 9	1,980	3,500	32'	25'11"	8'	296 5	23 75	5 54	8 7	23 7	15 1	Str.Sel	Sp	Fab	Re	86	G 7.50x10	Hyd	Spr.Ol	Rw	ST.Wl.Fab
13 5	9 9	1,980	3,500	34' 2"	24'6"	7'10"	181	12 35	7 1	6 11	17 3	13 0	Lwd.Sp	Sp	Fab.D	Fx	87	6 50x10	Go.Hyd	OlCeana	Wh	ST.Wl.Fab
13 5	14 8	1,400	2,450	34' 2"	25'	7'0"	131	12 35	7 1	6 11	17 3	13 0	Lwd.Sp	Sp	Fab.D	Fx	87	6 50x10	Go.Hyd	OlCeana	Wh	ST.Wl.Fab
17 3	11 3	3,600	5,100	41' 11"	32'7"	9'1"	295	30 1	14 9	9 58	40 0	22 7	Lwd.Sp	Sp	Fab	Re	118	8 50x10	Go.Hyd	Ol.Hx	Rw	ST.Wl.Fab
14.2	14 3	1,230	2,868	40'	30'10"	8'9"	157 5	16 08	14 41	9 58	14 58	12 38	Rac type 18%, chord	Full cant	Plastic bonded mahog.	Re	98½	Retractable 360° swivel tail	Hyd			Modified NACA Model 35-B
13 2	17 58	1,482	2,550	36'4"	25'7"	8'	193 3	21 0	6 1	10 1	21 9	13 5	Str.Sel	Sp	Fab	Fx	111	Hs 7 50x10	Hyd.Fol	Ol	Wh	ST.Wl.Fab
14.7	12 1	2,320	3,450	36'0"	32'0"	12'6"	235 0	23 3	10 9	12 5	6 7	15 1	SS.Wl	SS.Wl	Fab	Re	93½	7.1-5x18	Gr.Fol	Rz	Wh	SS.Wl
15 96	12 5	2,453.2	3,750	40'0"	32'0"	12'6"	235 0	23 3	10 9	12 5	6 7	15 1	SS.Wl	SS.Wl	Fab	Re	93½	7.1-5x18	Gr.Fol	Rz	Wh	SS.Wl
16 0	12 67	2,527.7	3,930	40'0"	32'0"	12'6"	235 0	23 3	10 9	12 5	6 7	15 1	SS.Wl	SS.Wl	Fab	Re	93½	7.1-5x18	Gr.Fol	Rz	Wh	SS.Wl
18.375	11 25	3,675	4,500	48'	33'6"	9'	245 0	14 6	12 3	14 8	25 2	19 6	D.Rac	D	Ma.Fab	Re	90	Hs 7 50x10	Hy.Hyd	Rz.Ol	Wh	D.Ms
14 05	12 94	1,750	2,300	35'0½"	23'8"	7'3"	185 0	13 92	12 38	11 9	21 2	17 12	D	Me	D	Re	91	21"Sl Gen	Hyd	Aer.Ol	Wh	AD Rv
20 7	14 5	2,725	4,250	38'5"	28'10½"	9'2"	290 0	18 54	11 72	9 63	21 27	21 20	Sel.Sp	Sp	Fly	Fx	100	8 50x16	Go.Hyd	Ol.Hyd	Wh	ST.Wl.D.Fab
20 7	14 5	2,580	4,250	38'0"	28'6"	9'5"	290 0	18 54	11 72	9 63	21 27	21 20	Sel.Sp	Sp	Fly	Fx	100	8 50x16	Go.Hyd	Ol.Hyd	Wh	ST.Wl.D.Fab
13 9	17 9	1,582	2,550	36'2"	24'6"	7'10"	183 0	18 5	11 68	8 37	20 32	14 76	Sp.Bar	W	Fab	Re	120	Go 7 50x10	Go.Hyd	Ol	Wh	ST.Wl.Fab
19 3	17 4	1,595	2,375	33'6"	25'1"	7'5"	166 0	12 5	8 7	8 3	16 1	11 6	Sel.Sp	Sp	Fab	Fx	109	6 50x10	Del.Mach	Air-I	Wh	ST.Wl.Fab
14 3	15 8	1,525	2,375	33'6"	26'11"	7'5"	166 0	12 5	8 7	8 3	16 1	11 6	Sel.Sp	Sp	Fab	Fx	109	6 50x10	Del.Mach	Air-I	Wh	ST.Wl.Fab
14 3	14 6	1,410	2,375	33'6"	26'11"	7'5"	166 0	12 5	8 7	8 3	16 1	11 6	Sel.Sp	Sp	Fab	Fx	109	6 50x10	Del.Mach	Air-I	Wh	ST.Wl.Fab
16	14 6	1,750	2,750	37'10½"	27'10½"	8'7"	253 5	27 87	17 0	15 16	25 03	19 75	ST.Wl.Tra	Ru.D	Fab	Fx	111½	Hs 7 50x10	Gr.Hyd	Sp.Ol	Wh	ST.Wl.Fab
16.0	11 1	3,045	4,750	41' 10½"	30'5"	9'7"	253 5	22 62	12 0	15 16	25 03	19 75	ST.Wl.Tra	Ru.D	Fab	Fx	111½	Hs 7 50x10	Gr.Hyd	Spr.Ol	Wh	ST.Wl.Fab
16 23	14 04	2,552	4,200	41' 10"	27'6"	9'0"	246 0	16 39	5 47	9 39	17 1	29 88	Sp	Sp	Fly		101	7 50x10	Go.Hyd	Waco.Ol	Wh	
17 06	14 0	2,561	4,200	39'0"	27'10"	9'0"	246 0						Sp	Sp	Fly		101	7 50x10	Go.Hyd	Waco.Ol	Wh	
17 06	10 5	2,734	4,200	34'0"	27'0"	9'0"	246 0	16 39	5 47	9 39	17 1	29 88	Sp	Sp	Fly		101	7 50x10	Go.Hyd	Waco.Ol	Wh	
17 06	10 5	2,761	4,200	34'0"	27'0"	9'0"	246 0	16 39	5 47	9 39	17 1	29 88	Sp	Sp	Fly		101	7 50x10	Go.Hyd	Waco.Ol	Wh	
13 32	14 44	1,945	3,250	33'3"	25'8"	8'4"	244 0						Sp	Sp	Fab		102	7 50x10	Ha.Hyd	Waco.Ol	Wh	
13 32	11 40	1,981	3,250	33'3"	25'4"	8'4"	244 0						Sp	Sp	Fab		102	7 50x10	Ha.Hyd	Waco.Ol	Wh	
19 32	13 54	1,960	3,250	33'3"	25'4"	8'4"	244 0						Sp	Sp	Fab		102	7 50x10	Ha Hyd	Waco.Ol	Wh	
15 45	12 67	2,584	3,800	34'0"	27'7"	9'0"	246 0						Sp	Sp	Fab		99	8 50x10**	Go.Hyd	Waco.Ol	None	
10.89	15 4	2,010	5,400	45'	26'6"	10'5"	350 0	26 0	3 5	10 7	19 5	17 1	Sp	Sp	Fab	Fx	96	Wire 32x6	Hyd	Ol	W	D.Ru.Fab

14 3	15 0	2,752	4,500	48' 10"	33'6"	9'6"	319 0	32 0	5 5	12 0	28 0	18 0	Sp.Box	W	Fab	Fx	165½	Ast 7.50x12	Aut	Ol	Wh	ST.Wl.Fab
14 06	17 10	2,750	4,500	48'	33'4"	10'0"	320 0	32 5	5 5	12 0	28 0	18 0	Sp.Box	W	Fab	Fx	165½	Ast 27"	Aut.Hyd	Ol	Wh	ST.Wl.Fab
20 7	18 3	4,670	7,500	47'0"	34'3"	9'5"	347	23 5	16 3	17 3	38 2	27 2	ST.Wl	D	D	Re	154½	Go 29x13.5	Hyd.Co	Air,Ol	Rw	D
21 5	8 3	5,196	7,500	47'0"	34'3"	9'5"	347 0	23 9	16 3	17 3	38 2	27 2	ST.Wl	D	D	Re	154½	Go 29x13 5	Hyd.Co	Air,Ol	Rw	D
17 38	15 90	3,115	11,400	65'	42'0"	11'6½"	664 0	46 0	21 0	21 0	60 0	36 0	Sp.Sp	S	Fab	Fx	216	Go A.W.Skid	Hyd	Ol	Wh	ST.Wl.Fab
17 38	11 28	3,440	5,500	48'6"	27' 11"	9'6"	359 0	40	16 0	12 0	31	23 40	Sp.Sp	S.Fly	Fab	Fx	96	Go 31"	Go.Hyd	Ol	Wh	ST.Wl.Fab
15 56	13 0	3,000	5,500	50'6"	27' 11"	9'6"	359 0	40	16 0	12 0	30.0	23 4	Sp.Sp	S.Fly	Fab	Fx	96	Go 31.34"	Hx			
25 3	17 5	48.545	84,000	152	100'	27'7"	3962						D.S	D	AD.Fab							D.Rv.AD
25 3	12 5	30,800	45,000	152' 3"	94'4"	26'10½"	1485															
20 4	9 65	8,000	14,000	117'	64'	18'	686	55 0	26 0	44	72 0	47 5	M.D	D	D	Re	126	Ast	Aut	Aer.Ol	WA	D.Ru.D
23 4	12 4	19,360	33,500	95' 2"	67'	13'10"	1492 0	120 5	61 5	84 0	197 5	76 0	Ru.D	D	A.D	We	206 5	Aut 55x19	Aut	Aer.Ol	WA	D
23 4	12 7			95' 2"	67' 3"	13'10"	1492 0	120 5	61 5	84 0	197 5	76 0	D.Ru	D	D.Fab	Re	207	67" Sm.Cond.	Hyd	Wa		D.Ru.Mo
21 8	12 7			88'	63' 2"	19'9"	1400	100 0	60 0	80 0	189 0	85 0	D.Ru	D	D.Fab	Re		Floats				D.Ru.Mo
36 5	13 5			114'	79' 3"	23'6"	1758 0															
					50' 00"	11'0"																
					72' 7"	24' 11"																
					47' 000"	12'7 1"																
29 4	11 8	25,700	40,000	108'	76'4"	22'	1366 8	79 2	115 4	52 8	158.5	95	D.AD	D, AD	AD	Re	311	16x23	Hyd	Ol, Pn	Rw	D.Ru.AD
29 4	11 8	23 545	40,000	108	76 4"	22'	1366 8	79 2	115 4	52 8	158 5	85 0	D.AD	D, AD	AD	Re	311	19x23	Hyd	Ol, Pn	Rw	D,Ru,AD
25 5	10 5	16 600	25 300	95'	64'6"	18'11"	987 0	102 8	47 1	46 3	128 0	82.3	AD	AD	AD	Re	222	Bx 45x17—16	Bx.Hyd	Rz.Ol.Pn	Wh	AD.Rv.AD
25 5	10 5	16,565	25,200	95'	64'6"	18'11"	987 0	102 8	47 1	46 3	128 0	82.3	AD	AD	AD	Re	222	Bx 45x17 16	Bx.Hyd	Rz.Ol.Pn	Wh	AD.Rv.AD
35 8	10 0	34,425	52,000	117 6"	83'10"	22'9"	1462 8	120 4	72 5	63 4	210.0	118 6	AD	AD	AD	Re		16	Hyd	Rz.Ol		AD.Rv.AD
21 3	8 9	5,475	8 900	49'	38'4"	12'	375 0	22 5	26 7	21 0	44 0	31 2	D.Box	D	Mo	Re	96½	Ha 32x6	Ha.Hyd	Rz.Ol	Wh	D.Mo
33 50	8 80	12,200	19,300	65' 6"	49'9½"	11'10½"	551 0	35 0	29 3	34 8	93 6	40 4	AD.Ru	AD	AD	Re	184	Go 42.31x15.5	Go.Hyd	Aer	Wh	AD Ru.Mo
33 50	8 80	12,283	19 300	65' 6"	49'9½"	11'10½"	551 0	35 0	29 3	34 8	93 6	40 4	AD.Ru	AD	AD	Re	184	Go 42.31x15.5	Go.Hyd	Aer	Wh	AD Ru.Mo
33 50	10 30	11,676	18 300	65' 6"	49'9½"	11'10"	551 0	35 0	29 3	34 8	93 6	40 4	AD Ru	AD	AD	Re	184	Go 42.31x15.5	Go.Hyd	Aer	Wh	AD Ru.Mo
33 50	9 25	11 878	18 300	65' 6"	49'9½"	11'10"	551 8	35 0	29 3	34 8	93 6	40 4	AD.Ru	AD	AD	Re	184	Go 42.31x15.5	Go.Hyd	Aer	Wh	A D.Ru Mo
33 50	9 25	11 878	18 300	65' 6"	49'9½"	11'10"	551 8	35 0	29 3	34 8	93 6	40 4	AD.Ru	AD	AD	Re	184	Go 42.31x15.5	Go.Hyd	Aer	Wh	A D.Ru.Mo
43 00	8 95	27 524	43 000	95' 0"	74' 11½"	18' 4½"	1000 0	66 2	94 6	55 6	139 7	88 4	AD.Ev	AD	AD	Re	240	15-16x4?1/2	Go.Hyd	Ol	Ty	A D Rv.Mo
43 00	8 77	26 968	43 000	95' 0"	74 11½"	18 4½"	1000 0	66 2	94 6	55 6			AD.Ru	AD	AD	Re	240	15-16x42½	Go.Hyd	Ol	Ty	A D.Ru.Mo
22 9	13 15	6,450	10 500	55	38'2"	10'1"	458 3	29 5	17 7	19 5	60 5	35 0	AD.Rv	AD	AD	Re		Ge 35x15-6	Go.Hyd	Aer	Wh	AD Rv AD
22 91	11 66	7,100	10 500	55	38'2"	10'1"	458 3	29 5	17 7	19 5	60 5	35 0	AD.Rv	AD	AD	Re		Ge 35x15-6	Go.Hyd	Aer	Wh	AD Rv AD
23 8	10 82	5,960	8 650	49' 6"	36' 4"	9'11"	352 0	22 1	13 6	17 3	54 4	33 8	AD.Rv	AD	AD	Re	13½*	Go 11 0x12	Or Pal	Aer	Wh	AD Rv AD
27 3	18 2	51 252	83 000	152'	91' 10"	22'2½"**	2300 0	113 3	68	64 0	233 4	124 0	D	D	D							D D
31 3	14 0	24,200	42,000	119'2"	68'	21'5"	1360 0	103 7	64 0	62 0	146 0	79 4	D Tr	D	D.Fab							D Rv
25 0	13 0	12,900	18 500	96'	51'2"	17'8"	780 6	53 2	35 4	36 6	86 4	41 7	D.Box	D	D.Fab	Re	134	Ha.Aut 12x45	Hyd	Ol	Wh	D Rv
25 64	13 33	13 100	20 000	96'	52'3"	17'0"	780 6	53 2	38 8	30 74	86 4	58 47	D.Box	D	D.Fab	Re	134	He Aut 17x45	Hyd	Ol	Wh	D Rv
34 4	13 7	30,200	57 500	122'	79'3"	27'3½"	1670 0						D Tr	D	D.Fab							D.Ru

Civil Aircraft Footnotes. These refer to tables on pages 105 and 106 also.

1 Plastic type.
2 First minute.
3 Available as seaplane or skiplane.
4 Also available with 170 gal. capacity.
5 Also available with 121 gal. capacity.
6 Also available with 210 gal. capacity.
7 Also available with 260 gal. capacity
8 All range figures with 45 minute reserve fuel.
9 Brake Rubland Wendt mechanical shock strut Goodrich-Wendt rubber spring. (some present).
10 Tail unit 360° swiveling Servite-tred service caster Buffalo spring.
11 Tricycle.
12 Retractable, steerable nose wheel.
13 At most economical speed.
14 Plastic bonded wood veneer
15 Rm. Rt.
16 On bearing gear
17 At 60% full power.
18 At 60% power
19 Due Landing.
20 Rotor diameter.
21 Rotor due.
22 Trim flaps.
23 Step tapered elliptical.
24 Steerable and castoring.
25 High pressure.
26 Structure approved for ski-plane.
27 Frankl a 80 and 90 amply weights inside electric starter and motor driven generator
28 Steerable tail wheel.
29 Ship is metal-covered to rear cabin; center section flap sliding hatch counter-balanced aileronn trimming tabs on elevators.
30 Cantilever
31 Oil and spring.
32 Plastic bonded, wood veneer web.
33 Plastic bonded.
34 May be equipped with Piper S-1000 skis.
35 Radio installation available
36 Also as photographic plane or with floats or skis.
37 Also available with 45 gallon and 52½ gallon capacity.
38 Pressurized V/L, actual hub speed 169 mph.
39 Also available with 130 gal capacity
40 Also available with 21 in. circumflum or 23x10-4 wheels with hydraulic brakes.
41 With 2-position propeller
42 All range figures with 15% reserve fuel.
43 Navy model.
44 7.50 x 10 front.
45 Steerable tail wheel available.

Geared Power
for the PIPER CRUISER

QUICKER TAKE-OFF ★ FASTER CLIMB ★ EXTRA ECONOMY

LYCOMING
Geared "75"

Lycoming *Geared* "75" Installed in the Piper Three-place Cruiser

Whether you buy a Piper Cruiser for passenger carrying, pervate flying or student instruction you'll like power by the Lycoming *Geared* "75". Other air-cooled, horizontally opposed Lycoming engines are available in direct-drive models of 50 to 175 horsepower, single or dual magneto ignition with provision for *mechanical or electric starter*, generator and fuel pump drives.

A Full Load "Gets Out in a Climb" Behind a Lycoming *Geared* "75"

The quicker take-off and faster climb of the Lycoming *Geared* "75" is most apparent under full-load conditions—when you have extra need for plus performance

Contractors to the U. S. Army and Navy

YOU who buy or fly the Piper three-place Cruiser will want to consider the superior performance and dollars-and-cents savings in operating costs of the Lycoming *Geared* 75-horsepowet engine. Ideally suited to the Cruiser's greater load-carrying capacity, the Lycoming *Geared* "75" develops its horsepower faster. Consequently, take-off is quicker and rate-of-climb better. Higher engine speed, with a slower-turning, larger-diameter propeller, makes for incomparable smoothness. The tecognized economy of higher piston speeds is reflected in amazingly low gasoline consumption . . . approximately only 4¾ gallons per hout at cruising! Fly this dependable Lycoming engine in the Piper Cruiser and feel the difference *geared* power makes.

FREE LITERATURE:—on Lycoming 50 to 75-horsepower light-plane engines may be obtained from all Piper, Aeronca, Funk, Luscombe, Porterfield and Taylorcraft dealers Or write Lycoming Division, Dept. AA21, Aviation Manufacturing Corporation, Williamsport, Penna., U.S.A. . . . Cable address Aviatcor

YOU CAN RELY ON
LYCOMING
50 to 300 H.P
Engines

FOR MILITARY AND CIVILIAN TRAINERS ★ FOR PRIVATE AND COMMERCIAL PLANES

★ More Power to You FOR 1941

FOUR NEW LYCOMING AIRCRAFT ENGINES

100-125-150 AND 175 HORSEPOWER

With the addition to the Lycoming family of these four new "stars of the skyways" you now have your choice of power by Lycoming horizontally opposed engines in 50, 55, 65, 75, 100, 125, 150 and 175 horsepower. These brilliant new engines are born of a tradition of excellence . . . consecrated to engineering standards attained through years of building to the high specifications set forth by America's armed forces. A Lycoming engine in the airplane you buy, whatever its horsepower, is an assurance of dependability, with seasoned experience and skilled workmanship reflected in every operation, from the designer's board to the final connection of the last spark plug.

FREE LITERATURE: We shall be glad to send you complete details and specifications of the new Lycoming 100, 125, 150 and 175-horsepower engines. Address Lycoming Division, Department A21, Aviation Manufacturing Corporation, Williamsport, Pennsylvania, U S A. Cable address Aviatcor

- ★ **THE 100 H.P. O-235** A four-cylinder, direct-drive engine with 235 cubic-inch displacement
- ★ **THE 125 H.P. O-290** A four-cylinder, direct-drive engine with 290 cubic-inch displacement
- ★ **THE 150 H.P. O-350** A six-cylinder, direct-drive engine with 350 cubic-inch displacement
- ★ **THE 175 H.P. O-435** A six-cylinder, direct-drive engine with 435 cubic-inch displacement

YOU CAN RELY ON

LYCOMING 50 to 300 H.P. Engines

Contractors to the U S Army and Navy

FOR MILITARY AND CIVILIAN TRAINERS ★ FOR PRIVATE AND COMMERCIAL PLANES

American Aircraft Engine Specifications

AVIATION does not assume responsibility for the figures given

[illegible]

Aviation's Military A

AVIATION does not assume re

Military Manufacturer	Designation or Model No.	Type	Number of seats	Make of engine	Total rated h.p.	At altitude, ft.	Fuel capacity (gal.)	Normal range (mi.)	Full supercharger, accessory speed (rpm per hr.)	Propeller diameter—(ft.)	High speed (m.p.h.)	At altitude, ft.	Cruising speed (m.p.h.)	At altitude, ft.	Stalling speed (m.p.h.)	Climb at sea level (ft. per m.)	Service ceiling (ft.)	Wing loading (lb. per sq. ft.)	Power loading (lb. per h.p.)	Weight empty
		General		Power Plant							Performance							Weights		
Beech Aircraft Corp.	U.S.A. Air Corps YC-43	CML	4	2 Pwj	450	S.L.				99										
Beech Aircraft Corp.	Navy Bu. of Aero. GB-1	CML	8	2 Pwj	450	S.L.				99										
Beech Aircraft Corp.	ORF-1 Utility Transport	CML	5	2 Pwj	900	S.L.				99										
Beech Aircraft Corp.	C-45 Personnel Transp.	CML	5-6	2 Pwj	900	S.L.				99										
Beech Aircraft Corp.	F-2 Photographic Plane	CML	4	2 Pwj	900	S.L.				99										
Beech Aircraft Corp.	AT-10 Light Bomber	CML	5	2 Pwj, Ww	900	S.L.				99										
Bell Aircraft Corp.	P-39 Airacobra	CLM	1	ALN	1,000	15,000	140	1 560	56 6	124 5	31 09	6 07	4,95							
Bellanca Aircraft Corp.	28-110	CML		Pwww	1 100						291								4 72	
Boeing Aircraft Co.	B-299T Flying Fortress	CML	7-9	4 Wi Cy	4 000	S.L.	1 700	Over 3 000		138	325				70	2,267	21,700	33.5	6 11	60 31,10
Brewster Aeronautical Corp.	138	CML	2	Wi, Cy	750	15 200	136			108										
Brewster Aeronautical Corp.	239	CML	1	Wi Cy	750					108										
Brewster Aeronautical Corp.	339	CML	1	Wi Cy	800		160			123										
Brewster Aeronautical Corp.	340	CML	2	Wi, Cy	1,350	19 000	177			146										
Central Aircraft Corp.	X-BAB-3 Attack Bomber																			
Consolidated Aircraft Corp.	28 Military Amphibian	CMA	7	2 Pwww	2 100	7 800		5300			210	7,500	184	10,000	85		17,000	22 8	13 3	
Consolidated Aircraft Corp.	28 Military Flying Boat	CMF	7	2 Pwww	2,100	7 500		3900			198	7,500	184	10,000	85		18,000	21 5	12 5	
Consolidated Aircraft Corp.	32 Landplane Bomber	CML	7	4 Ww																
Crosley Aircraft Corp.	CIP-51		1	Ran. V12	1 500															
St. Louis Aviation, Div. Curtiss-Wright	21 Interceptor	CML	1	Wi Cy	750	17 500	96	455	56 0	108	315	17,000	274	17,000	68	4,800	36,200	25 2	4 75	3,18
St. Louis Aviation, Div. Curtiss-Wright	Falcon 22	CML	2	Wi Ww	420	1,800	68	510	25 6	99	215	2,500	195	2,500	58	4,300	23,300	16 4	7 62	2,30
St. Louis Aviation Div., Curtiss-Wright	21-B Interceptor	CML	1	Wi Cy	800	19 000	160	630	44 7	102	333	18,000	262	18,000	68	4,350	34,300	25 8	4 5	3,30
					1,000	5 600					314	5,600								
Curtiss Aeroplane Division, Buffalo, N. Y.	SOSC-1	CML	2	Rad 1d	520		199											19 25	10 7	4,17
Curtiss Aero Division	Navy Seagull SOSC-1	CMFL	2	Rad 1d	520		199											19 7	12 7	4,26
Curtiss Aero. Division	Helldiver-77	CBL	2	Cyy	950	15,200	135	855			235	15,000	174	15,200	68		28,500	19 7	6 6	4,54
Curtiss Aero. Division	P-40	CML	1	Alu	1 000	15000	100	593										29 6	6 4	5,67
Curtiss Aero. Division	Hawk #1-A	CML	1	Alu	1 090	15,000	100	593										29 6	6 4	5,67
Curtiss Aero. Division	H75-A	CML	1	Wi	1 000	15 000	165	1 003			323	15,000	262	15,000	69		32,700	24 5	4 8	4 54
Douglas Aircraft Co., Inc.	B-19 super Bomber																			
Douglas Aircraft Co., Inc.	DB-7 Hi Wi Att Bomber																			
Douglas Aircraft Co., Inc.	DB-7B Hi Wi Att Bomber																			
Douglas Aircraft Co., Inc.	A-20 High Wi Att Bomber																			
Douglas Aircraft Co., Inc.	A-20B High Wi Att Bomber																			
Douglas Aircraft Co.	C-47 Troop Transport																			
Douglas Aircraft Co., Inc.	SBD-1, 2, 3 Dive Bomb.																			
Douglas Aircraft Co., Inc.	BA-5 Low Wi Att Bomber																			
Douglas Aircraft Co., Inc.	A-20A Hi Wi Att Bomber																			
Fleetwings, Inc.	XBT-12 Basic Trainer	CML	2	Pwj			120													
Fletcher Aviation Corp.	FBT-2*	LM	2	Wi	285	S.L.	50	540	11 7	10*	115	S.L.	100	S.L.	60	1 340	19 000	20 0	8 73	1 74
Grumman Aircraft Engineering Corp.	Delfity J2F 1	CBA	2-4	Wr Cy	775	5 800	190	700	52 5	108	180	7,000	150	7,000	64	1 500	21,000	15 8	8 0	4,30
Grumman Aircraft Engineering Corp.	G-21B	CMA	8	2Pwj,Ri	900	5 000	220	800	51	102	201	5,000	190	5,600	62	1 300	22,000	21 5	8 9	5,42
Grumman Aircraft Engineering Corp.	G-36A Fighter	CML	1	Wr Cy	1 200	Take-off														
Grumman Aircraft Engineering Corp.	JRF-2* (CG)	CMA		Pwj Ri	800	5 000	220	1,000		102	200	5 000	190	9 000	65	1,300	22 000	21 3	8 9	5,53
Grumman Aircraft Engineering Corp.	F4F 3 Fighter	CML	1	Pwww	1,200	Take-off														
Harlow Aircraft	PC-5	CLM	2	Warner	145	S.L.	34	500	9 5	84	145	S.L.	140	S.L.		600	12,200	14 05	12 94	1 79
Kellett Autogiro Corp.	XO-1A	COJY	2	Wr Cy	300	S.L.	30	305	14 0	102	125	S.L.	100	S.L.	Nil	1 000	14,000	40 0	9 56	1,96
Lake Aircraft Corp.	LK-W	CML	3	2Pwww	2 100	7,100	700	2 470		132	310	14 000	248		69	1,700	31,500	28 4	8 5	10 56
Glenn L. Martin Co.	162 (TBM-1)																			
Glenn L. Martin Co.	71-26																			
North American Aviation, Inc.	NA-16-5	CML	2	Pww	550	5 000	111	750	23 5	105	200	5 000	150	12,000	66	1,350	23,000	20 73	9 50	3,95
North American Aviation, Inc.	NA-46A	CML	5	Wr Cy	2 500	12 000	916		133	150	308	13 000	299	18 000	85	1 880	25,400	39 33	7 50	18 00
North American Aviation Inc	NA-73	CML	1	Alu	880	12,000	105		48 3	126								32 6	7 34	5,99
Northrop Aircraft, Inc.	N-3PB		1	Wright G 200	1 200	S.L.	175	785	56½	126	217	10,400	150	5,000	63	1,280	24,000	22½	8 95	5,15
Northrop Aircraft Inc.	N-3		3	Pw R-2,800	2,000	S.L.	130		52½	138	330	14,000	215	2,000	68	3,000	30,500	22½	5 67	6 50
Northrop Aircraft Inc.	N-5		5	Wright G-200	1,200	Tk-off	175	785	38½	126	242	16,800	172	5,000	65	1,725	26,000	22½	8 95	5,47
Philips Aviation Co.	X-PT	CML	2	Ranger	165	S.L.	38		10 5	92	156	S.L.	139	5,000	46	920	12,400			1,69
Republic Aviation Corp.	U S Army Air Corps P35	CML	1	Pwww,Ri	850	8 000	100			10'6"								25 2	6 5	4 27
Republic Aviation Corp.	ZPA A Model 230	CMA	2	Wi Cy,Ri	550	5 800	230	130		9'0"	225	5 800						26 0	7 65	
Republic Aviation Corp.	EP-1 Model 106 U S A AC P-35A	CML	1	Pwww Ri	1 050	11 500	200	600		10'6"	305	12 000	260	15,300	83	2,800	30 000	27 1	5 76	4 70
Republic Aviation Corp.	12 PA Model 204A USA AC YP-43	CML	1	Pwww,Ri	1,050	11,800	200	560		10'6"	293	11,800	250	15,000	86	2,050	28 00	30 0	7 12	5,14
Republic Aviation Corp.	Lancer USA AC YP-44	CML	1	Pwww,Ri	1 200	23 000	145	570		11'0"	375	23 000	325	23,000	66	3,380		32 1	5 96	5,47
Ryan Aeronautical Co.	STM-82	CMFL	2	Mas	150	3,000	24	246	10 0	80	122	S.L.	108	S.L.	59	700	12 250	14 7	12 2	1,31
Ryan Aeronautical Co.	ST-3	CML	2	Kin	125	S.L.	24	312		90	120	S.L.	109		56 4	635	12 800	15 2	14 2	1,22
Ryan Aeronautical Co.	ST-3	CML	2	Kin	125	S.L.	24			90	120	S.L.	109		56 4	635	12 800	15 6	14 4	1,23
Ryan Aeronautical Co.	ST-5	CML	2	Mas	125	S.L.	24	345		89	120	S.L.	105		50 4	600	12 900	15 2	14 2	1,24
Ryan Aeronautical Co.	ST 5	CML	2	Mas	150	3,000	24			89	130	S.L.	122		57	830	16 000	13 6	12 2	1,24
Stearman Aircraft Co.	76D1	OL2	2	Pwj	520	S.L.	70	540		105	151	S.L.	135	S.L.	58	1 000	18 400	10 9	10 1	2,32
Stearman Aircraft Co.	76C3	OL2	2	Pwj, Wr	400	5,000	100	550		105	158	S.L.	135	5,000	58	1,000	19,000	11 5	9	2,58
Stearman Aircraft Co.	76D5	OL2	2	Pwj Ri	400	5,000	100	635		105	157	5,000	135	5,000	57	1 410	23 600	10 92	8 125	2,45
Stearman Aircraft Co.	76D1	OL2	2	Pwj	320	S.L.	70	478		105	138	S.L.	118	S.L.	58	840	15,000	11 87	11 0	2,45
Stearman Aircraft Co.	A75L3	OLB	2	Ly	225	S.L.	46	386		102	125	S.L.	103	S.L.	51	825	13 200	9 02	11 9	1,97
Vought-Sikorsky Div., United Aircraft	V-142 —	CML	2	Wi Cy	750	9 000		120		108	232	9,000	172	9 000	65	1 330	24,200	16 68	7 28	3,55
Vought-Sikorsky Div., United Aircraft	V-156	CML	2	Pwwj	750	9 000	130	701	30 5	132	257	11,000	227	10 000	60	1 345	28 200	21 5	6 7	4,50
Vought-Sikorsky Div., United Aircraft	OS2U-1 [10]	OM	2	Pwww																
Vought-Sikorsky Div., United Aircraft	OS2U-2 [10]	OM	2	Pwww																
Vought-Sikorsky Div., United Aircraft	XPBS-1	CMF																		
Vultee Aircraft Inc.	V 12C	CML	3	Wi Cy			250	1 830			242	6,800	226	15,500			25 200			6 48
Vultee Aircraft, Inc.	V-12D	CML	3	Wi Cy			250	1 830			264	6,800	240	12 000			25 800			7 28
Vultee Aircraft, Inc.	Vanguard P-48	CML	1	Pwww	1 200	4,000	240	700			340	6,000	290	16,000			33 000			7 92
Vultee Aircraft Inc.	Valiant 54	CML	2	Pwj	450	S.L.	92	730			182	S.L.	176	5,000			21 000			2,92
Vultee Aircraft, Inc.	Observation Vigilant-74	CML	2	Ly	290	S.L.	47				133	S.L.	121	S.L.	31	1 100	20 000			2,54
Waco Aircraft Co.	SZHD	CBL	2	Pwj Ri	420	1,800					158	S.L.	138							
Waco Aircraft Co.	WHD	CBL	2	Wr Ri	420	1,800					162							14 25	9 47	
Waco Aircraft Co.	UPF-7	CBL	2	Ly Ri	220	S.L.	50	320	12 5		155	S.L.	105	S.L.	51	600	14 600	14 25	9 02	
																		10 65	12 06	2,59

[1] Has camera hatch in hull bottom for aerial mapping. Complete set of flight and engine instruments. Provision for installation of drifting equipment. Accessories as in G-31A.

[2] Main landing gear, smooth contour; nose wheel 10 in.

[3] Steerable and swivelable.

[4] Plastic.

[5] Full retracting electric.

[6] Six machine guns, self-sealing tanks; all additional information is restricted.

[7] First 35% of wing, spot welding.

[8] Critical altitude.

[9] Main float and two wing floats.

[10] Front section tubular steel frame and metal panels; rear section aluminum alloy semi monocoque.

[11] Total capacity, including "overload" fuel — 190 gallons.

Aircraft Specifications

...esponsibility for the figures given

Gross weight (lb.)	Dimensions: Span	Dimensions: Length overall	Dimensions: Height overall	Area — (Sq. Ft.): Wing (including ailerons)	Area: Ailerons (total)	Area: Fin	Area: Rudder	Area: Stabilizer	Area: Elevators (total)	Wings: Spars	Wings: Ribs	Wings: Covering material	Landing Gear: Type	Landing Gear: Tread (in.)	Landing Gear: Wheel type and size	Landing Gear: Brakes (type and make)	Landing Gear: Landing gear shock unit (type and make)	Landing Gear: Tail unit	Fuselage or Hull†
	32'	25'11 9/16"	8'	296.5															
	32'	25'11 9/16"	8'	296.5															
	47'0"	34'3"		347															
	46'8"	34'3"	8'	347															
	47'8"	34'3"	8'	347															
	47'0"	34'3"	8'	347															
6,662	34'	29'9"	9'2.75"	213	15.04	9.81	10.22	24.22	17.34	Mr	Mr	Str. Skin	Re Ty	136	26"x6"	Hyd	Ol		Mo
8,454																			
47,500	103'9 1/2"	67'10 1/2"	15'4 1/2"							D	D	AD	Re				Ol,Pn	RW	D,Rv AD
	39'	27'10"	10'11"							S.M.B.	Al,Tr	Al,Fab	Re		27x8	Hyd	Ol,Pn		Mo
	35'	26'5 1/2"	12'							S.M.B.	Al,Tr	Al	Re		27x8	Hyd	Ol,Pn		Mo
	35'	25'7 1/2"	12'							S.M.B.	Al,Tr	Al	Re		27x8	Hyd	Ol,Pn		Mo
	47'	39 1/2'	15 1/2'							S.M.B.	Al,Tr	Al	Re			Hyd	Ol,Pn		Mo
32,000	104'	65'2"	19'9"	1,400	100	60.8	50	119.8	85.0	D,Rv	D	D,Fab	Re	16'7"	47" SmContr	Hyd	Oleo		D Rv Mo
30,100	104'	65'2"	19'9"	1,400	100	60.8	50	119.8	85.0	D,Rv	D	D Fab	Re		Floats				D Rv Mo
47,000	110'	65'4"	17'11"																
										Ply		Pl,Lnd							Ply Lnd
4,180	35'	26'4"	8'8"	174.3	11.9	8.06	7.36	16.98	8.58	AD	AD	AD	Re	85	7.50x10 Gu	Gu,Hyd	Ol,Pn	Wh	D Rv,AD
3,200	35'	26'6"	7'6"	174.3	11.9	8.06	7.36	16.98	8.58	AD	AD	AD	Re	85	7.50x10 Gu	Gu,Hyd	Ol,Pn	Wh	D Rv,AD
4,500	35'	26'4"	8'8"	174.3	11.9	8.06	7.36	16.98	8.58	AD	AD	AD	Re	107	27" Gu	Gu,Hyd	Ol,Pn	Wh	D,Rv AD
5,586	36'	34'2"	11'4"	290		13.9	13.1	33.2	28.0	Ms	Ms	AD	Fx			Hyd	Curt Ol	Wh	Mo,AD
5,729	36'	36'9"	15'	290		13.9	13.1	33.2	28.0	Ms	Ms	AD	Fl						Mo,AD
6,256	34'	27'5"	10'4"	317		10.3	12.5	34.4	24.9	Ms	Mr	AD	Re			Hyd	Curt,Ol	Wh	Mo,AD
6,789	37'3"	31'7"	10'6"	236		7.0	13.2	28.8	19.2	Mr	Ms	AD	Re			Hyd	Curt Ol	Wh	Mo,AD
6,970	37'3"	31'7"	10.6'	236		7.0	13.2	28.8	14.2	Ms	Ms	AD	Re			Hyd	Curt Ol	Wh	Mo,AD
5,751	37'3"	28'8"	9'5"	236		7.0	13.2	28.8	19.2	Ms	Ms	AD	Re			Hyd	Curt,Ol	Wh	Mo,AD
	40'	29'2"	10'4"							SS	SS	SS,Fab						SS,Wh	SS
2,500	30'	23.2'	8.1'	125	11.4	0.9	4.1	17.8	8.2	Sp	Sp	Ply	Fx	101	Firestone 8.00x6	Firestone Hyd	Air-Ol	Wh	Mo Ply
6,120	39'		12'4"	409	32.0	14.2	10.6	32.1	24.6	D	D	Fab	Re	90	30x7	Hyd	Bx Ol	Wh	D Mo
8,000	49'	38'4"	12'	375.0	22.5	26.7	21.0	44.8	31.2	D,Box	D	Ms	Re	90 1/2	Bx 33x6	Bx,Hyd	Bx Ol	Wh	D Mo
..	38'	28'10"	9'2 1/2"	260	11.48	13.2	9.38	30.43	18.6	D	D	Ms	Re		26x6	Hyd	Bx Ol	Wh	D Ms
7,955	49'	38'4"	12'	375.0	22.5	26.7	21.0	44.8	31.2	D,Box	D	Ms	Re	90 1/2	Bx 30x7	Bx Hyd	Bx,Ol	Wh	D Ms
2,400	35'9 1/2"	23'4"	7'8"	165.0	13.02	12.58	10.9	21.2	12.12	D	Ms	D	Re	91	21" SlGen	Hyd	Aer,Ol	Wh	Ad,Rv
2,245	40'	23'10"	10'3"	55.2		12.0	3.2	27.0		ST	Ply	Pl,Fab	Fx	114.5	8.00x5 Gr	Mech Bx	Ol,Bx	Wh	ST,Wl,Fab
15,297	51'4"	46'8"	10'	538.5	47.5	18.82	23.09	73.56	42.6	D	D	D	Re	195	39" SmContr	Hyd	Ol	Wh	D,Rv
5,200	42'1/4"	28'11 3/4"	8'9"	253.73	22.80	5.33	13.21	28.34	21.26	D	D	AD	Re	115 1/2	27" SmContr	Hyd	Aer	Wh	(b)
24,000	67'6"	51'5"	14'10 1/2"	610.1	32.3	40.8	35.6	92.0	46.0	D	D	AD	Re Ty	232"	47" SmContr	Hyd	Aer	Sk	D,Ms,AD
7,208	37'4"	32'2 1/2"	10'4"	235.95	16.6	10.07	10.80	28.04	16.46	D	D	AD	Re	141	27" SmContr	Hyd	Aer	Wh	D Ms,AD
8,500	48'11"	38'	16'10"	377	24	12.7	25.4	35.6	34.4	AD	AD	AD	Fl	11'2"					
9,630	48'11"	35'	10'2"	377	24	12.7	25.4	35.6	34.4	AD	AD	AD	Rw	144	36" SmContr	Hyd	Ol	Wh	
8,500	48'11"	35'	10'2"	377	24	12.7	25.4	35.6	34.4	AD	AD	AD	Rw	144	36" SmContr	Hyd	Ol	Wh	
2,500	36'2"	23'8"	7'8"	195	....					AD	AD	AD	Fx	38	Aut 6.50x10	Toe,Hyd	Aer Kl	Pn	Stff Skin
5,563	36'	25'4"	9'9 1/2"	220.0	19.3	10.0	9.5	18.9	16.2	D	D	AD	Re	7'10"	27"	Hyd	Ol	Ol	
6,500	41'	30'4"	14'4"	250.0	22.0	11.1	10.2	23.3	20.7	D	D	AD	A	7'10"	27" SmContr	Hyd	Ol	Re	
6,053	36'	26'10"	9'9 1/2"	220.0	19.6	9.96	7.96	18.9	16.2	D	D	AD	Re	7'10"	27" SmContr	Hyd	Ol,Pn	Re	D & AD
7,460	41'	27'0"	9'9 1/2"	250.0	22.0	10.17	9.61	23.4	28.9	D	D	AD	Re	7'10"	27" SmContr	Hyd	Ol,Pn	Re	D & AD
7,155	36'	28'5 1/2"	10'2 1/2"	223.2	19.5	10.1	9.5	19.2	15.9	D	D	AD	Re	9'2 1/2"	30" SmContr	Hyd	Ol,Pn	Re	D & AD
1,625	29'11"	22'8 1/2"	7'4 1/2"	124.0	12.0	4.7	7.2	12.0	10.0	Sol,Sp	D	Fab	Fx	7'1"	Edo F1 3965				D,Ms
1,775	30'1"	22'5"	7'2"	134.5	11.12	4.64	7.75	14.48	11.0	Sol,Sp	D	Fab	Fx	78 1/2	7.00-6	Mech	Ol	Wh	D,Ms
1,825	30'1"	22'3"	7'2"	134.3						Sol,Sp	D	Fab	Fx	78 1/2	7.00-6	Mech	Ol	Wh	D,Ms
1,275	30'1"	23'3"	6'10"	134.3						Sol,Sp	D	Fab	Fx	78 1/2	7.00-6	Mech	Ol	Wh	D,Ms
1,825	30'1"	23'3"	6'10"	134.3						Sol,Sp	D	Fab	Fx	78 1/2	7.00-6	Mech	Ol	Wh	D Ms
3,240	32'2"	24'5"	9'2"	297.4	18.74	3.14	11.83	21.5	14.14	Sol,Sp	Sp	Fab	Fx		S124"	Hyd	Ol	Wh	ST,Wl Fab
3,330	32'2"	24'3"	9'2"	297.4	18.74	3.14	11.83	21.5	14.14	Sol,Sp	Sp	Fab	Fx		S124"	Hyd	Ol	Wh	ST,Wl,Fab
3,250	32'2"	25'5 1/2"	9'2"	297.4	18.74	3.14	11.83	21.5	14.14	Sol,Sp	Sp	Fab	Fx		S124"	Hyd	Ol	Wh	ST,Wl,Fab
3,533	32'2"	27'9 1/2"	11'3"	297.4	18.74	3.14	11.83	21.5	14.14	Sol,Sp	Sp	Fab	Edo		(Twin Floats)				ST,Wl,Fab
2,686	32'2"	24'9 1/2"	9'4 1/2"	297.6	23.78	3.14	11.83	21.16	14.14	Sol,Sp	Sp	Fab	Fx	77 1/2	S124"	Hyd	Ol	Wh	ST,Wl,Fab
5,445	33'3"	27'9 1/4"	10'	327.0	26.5	6.74	13.35	26.6	18.18	D,I	D	Fab	Fr	72	Bx S127"	Bx,Hyd	Ol	Wh	ST,Wl,Fab
6,500	42'	33'11 1/4"	9'9 1/2"	305.3	27.6	10.62	11.45	23.72	16.44	D,SM,B	D	D,Fab	Re	120 1/2	Bx30x7	Bx,Hyd	Ol	Wh	ST,Wl,Fab
9,075	50'0"	38.2'	12'11"	364.0										132 1/2					Ms,SemiMo
10,425	50'0"	38.2'	12'11"	364.0										132 1/2					Ms,SemiMo
6,132	36'0"	28'0"	9'5"	197.0										160					Wl,ST, SemiMo
3,991	42'0"	28'7"	9'1"	230.0										128					Wl,ST, SemiMo
3,322	30'10 3/4"	33'6 1/2"	9'10"							All Ms		Fab	Fx						Wl ST Fab
3,400	32'4 1/2"	25'6 1/2"	---	256.3						Sp	Sp	Fab		85 1/4	8.50x10	Hs Mech	Wasc,Ol	Wh	
3,400	32'4 1/2"	25'6 1/2"		256.3						Sp	Sp	Fab		85 1/4	8.50x10	Hs Mech	Wasc,Ol	Wh	
2,650	30'	23'1"	8'6"	243.6						Sp	Sp	Fab		100	8.50x10	Hs,Hyd	Wasc,Ol	Wh	

Key to Abbreviations

- * —Approved or floats
- A —Amphibian
- Acp —Aircraft Prod
- AD —Alclad
- Aer —Aerol
- Al —Aluminum
- Als —Allison
- Apl —Applied for
- Ar —Aeronca
- Aut —Autolan
- Aw —Air Wheels
- B —Biplane
- Bo —Bolted
- Box —Box spar
- Bx —Bendix
- C —Closed
- CG —Coast Guard
- Con —Continental
- Crit —Critical
- Cy —Cyclone
- Cyy —Two-row Cyclone
- D —Aluminum Alloy
- E.H. —Elect Match
- F —Flying Boat
- Fab —Fabric
- Fl —Floats
- Fo —Ford
- Fr —Franklin
- Fx —Fixed
- G —Glued
- Gen —General
- Gu —Goodyear
- Gr —Goodrich
- Gy —Autogiro
- Ha —Hayes
- Hyd —Hydraulic
- I —"I" section
- Id —Inverted
- Jy —Jacobs
- K —Kinner
- Kr —Ken Royce
- L —Landplane
- Lam —Lambert
- LeB —LeBlond
- Len —Lenape
- Lmd —Laminated
- Lp —Low Pressure
- Ly —Lycoming
- M —Monoplane
- Ms —Metal
- Mech —Mechanical
- Men —Menasco
- Mil —Military
- Mo —Monocoque
- Mu —Multicellular
- O —Open
- Ol —Oleo
- Op —Optional
- Pal —Palmer
- Ply —Plywood
- Pn —Pneumatic
- Pob —Pobjoy
- Pwn —P & W Hornet
- Pwj —P & W Wasp, Jr
- Pwtj —P & W Twin Wasp, Jr
- Pww —P & W Wasp
- Pwtw —P & W Twin Wasp
- Q —Seaplane
- Ran —Ranger
- Re —Retractable
- Ri —Lord Instrument Mounting
- Rm —Lord Engine Mounting
- RW —Retractable Wheel
- Ro —Routed
- Rx —Rosco
- Rv —Riveted
- S —Steel
- Sc —Shock cord
- Se —Security
- Sk —Skid
- Sl —Streamline
- S.L. —Sea Level
- Sh —Shira
- S.M.B. —Single metal box
- Sol —Solid
- Sp —Spruce
- Spr —Spring
- SS —Stainless Steel
- Stu —Studebaker
- Sa —Szekely
- T —Tubing
- Tru —Truss
- Ty —Tricycle
- W —Wood
- War —Warner
- Wel —Welsh
- Wh —Wheel
- Wl —Welded
- Wr —Wright
- Ww —Whirlwind

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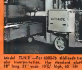
Model "LN 3"—For speedy transportation and placing of 6000-lb. skid loads. Has standard platform 55" long 27" wide, 10¾" high with 6" lift—Spur gear, drive and lift units—Rotor-Brush control system.



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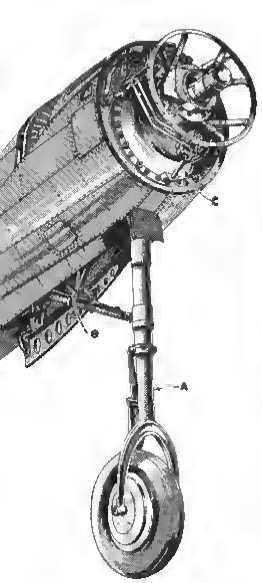

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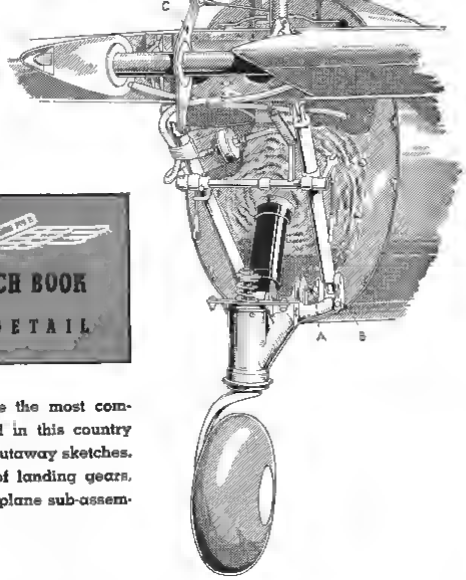
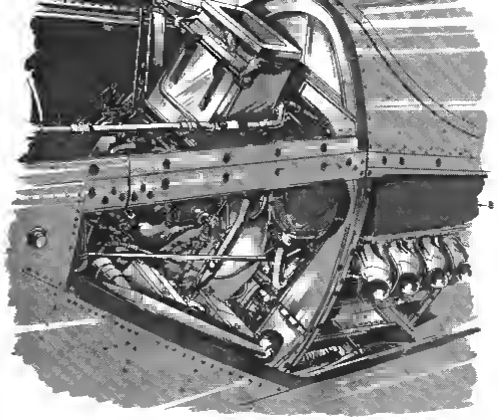


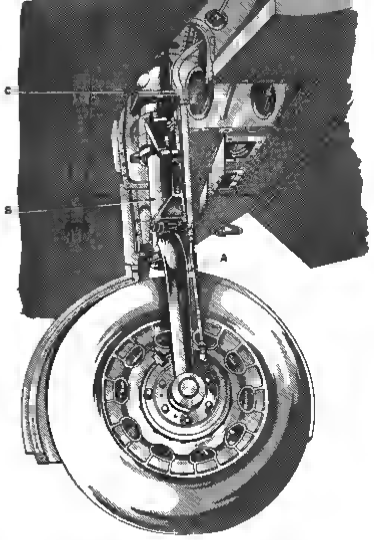
The nose wheel (above) of the Bell P-39 Airacobra is mounted far forward in the ship. The shock is taken by the Oleo at "A" with the torque scissors connected in the top and bottom of this section. Retraction is made by the mechanism at "B" "C" is the gear transmission housing where the drive shaft from engine comes in at the bottom so that propeller shaft is in the center of the ship.

The tail wheel unit (left) of the Vought-Sikorsky V-143 is of the fully retractable type hinged at "B", mounting a 19½ in. streamlined tire. The wheel is steerable through range of rudder movement by "A", but is automatically released at greater angular movements so that it will swivel freely throughout the remainder of 360 deg. An anti-vibration device is incorporated in the swivel mechanism. "C" is the elevator control.

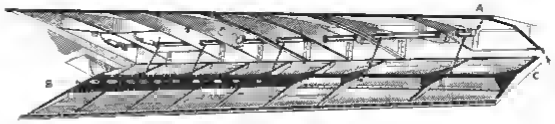
The landing gear (below) of the Fleet wings Trainer Model XBT-12 is mounted to the main wing spar by four sets of two bolts each, "B". The shock strut is attached to the axle through the large steel fitting at "A" "C" is where the outer wing panel is joined to the center section.



The Allison engine installation in the Bell P-39 Airacobra (above) mounts the air intake to the carburetor and supercharger at "A". The ship is so compact that there is but a small clearance between the cylinder heads and the outer section at "B".

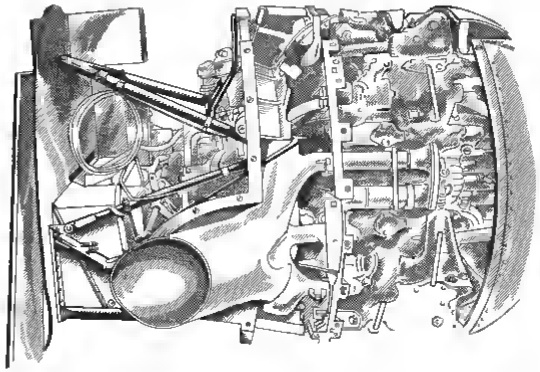


The landing gear of the Airacobra (above) takes the main load through the arm at "A" and the shock at "C". It is hinged just above point "C" and the wheels fold inward towards the center of the ship.

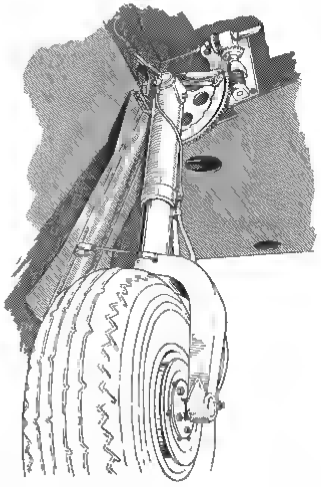


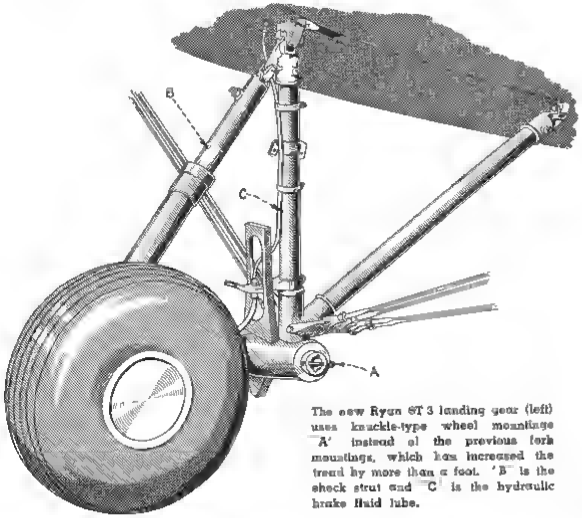
The wing flaps on the Airacobra are operated by means of the torque tube at "A". The flap has one center main spar at "B" with a piano hinge at "C".

The engine mount (below) of the Vought-Sikorsky V-143 consists of a welded chrome-molybdenum steel tube framework attached to the fuselage forward main frame at three points and to an auxiliary supporting structure at two points. This auxiliary structure, which is also of welded chrome-molybdenum tubing is in turn attached to the fuselage forward main frame at five points.

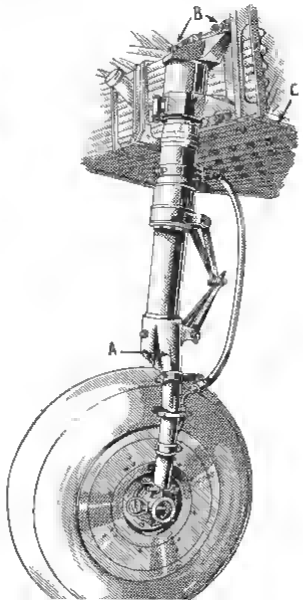


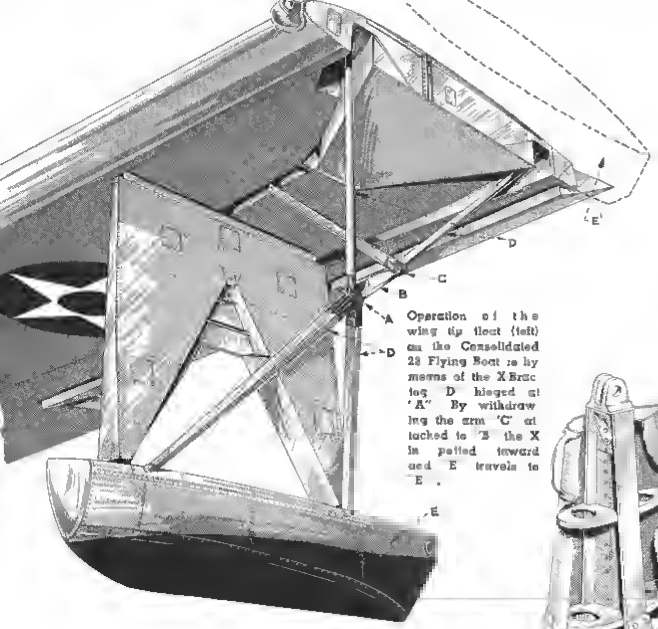
The landing gear of the Sunmit Model HM 5 (below) is retracted by means of the worm and quadrant gear. The worm is hand operated by the torque tube from the fuselage and an ingenious shock cord counter balance relieves any load from the pilot.



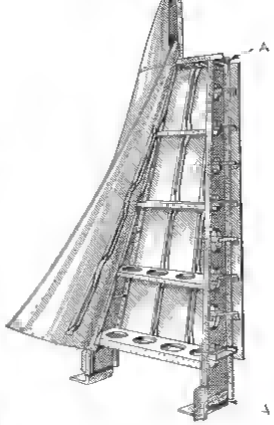


The new Ryan ST-3 landing gear (left) uses knuckle-type wheel mountings "A" instead of the previous fork mountings, which has increased the tread by more than a foot. "B" is the shock strut and "C" is the hydraulic brake fluid tube.

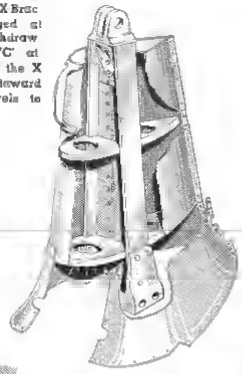




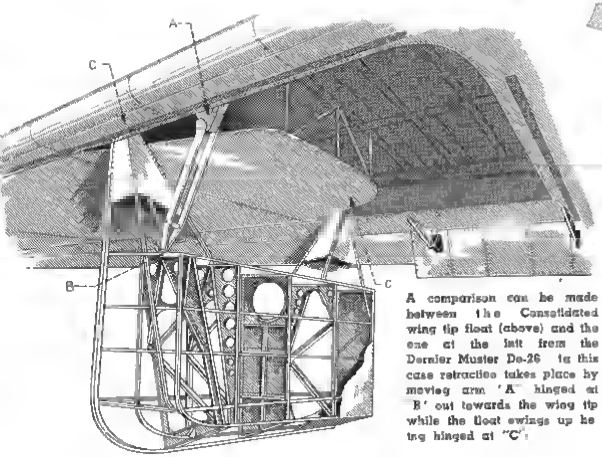
Operation of the wing tip float (left) on the Consolidated 28 Flying Boat is by means of the X Brace leg D hinged at 'A'. By withdrawing the arm 'C' attached to 'B' the X is pulled toward and E travels to E'.



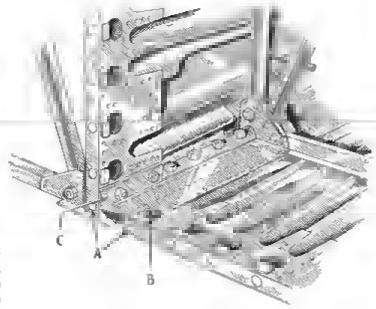
The fin of the Vought-Sikorsky V 143 (above) is of cantilever construction rigidly fixed to fuselage. It is of metal beam and rib construction with metal covering. The hinge line for the rudder is along 'A', and the upper portion of the fin above the top letter 'A' is removable.



The Navy float No. 68 utilizes the strut at the left in its attachment to the fuselage. It consists of one main beam, to take the stress, encased in a fairing. Note the handle for carrying.

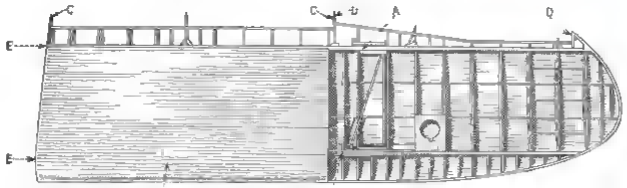


A comparison can be made between the Consolidated wing tip float (above) and the one at the left from the Dornier Muster Do-26. In this case retraction takes place by moving arm 'A' hinged at 'B' out towards the wing tip while the float swings up being hinged at "C".



The outer wing panel (above) of the Fleetwings Trainer Model XBT-12 is attached to the center section by means of bolts inserted through holes "A". From outside opposite "B" nuts are then attached. "C" is the joint of the main wing spar.

The outer wing panel of the Howard DGA 15 (right) is covered with mahogany plywood "B". At points "A" are chrome-molybdenum strut fittings. "D" are the aileron hinges and "C" flap hinges. "E" are the chrome-molybdenum attachment fittings.



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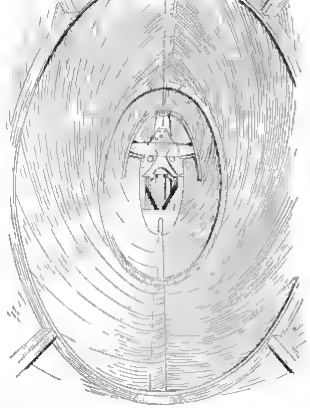
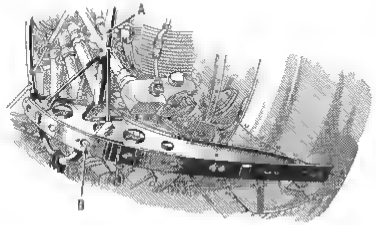
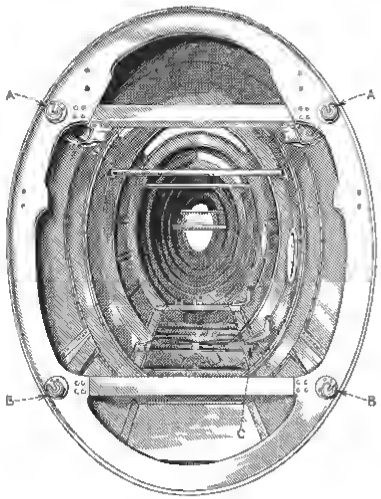
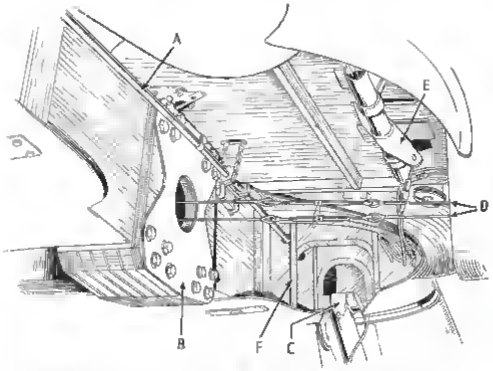


(above) View looking aft showing method of molding Summit HM-5 fuselage. Note join lines on top and bottom and accessibility of tail section for inspection.



The fuselage of the Ryan STA (below) is of semi-monocoque construction with four main longerons. The upper ones at 'A' the lower ones at 'B'. The forward seat is installed at 'C' with a duplicate installation immediately behind.

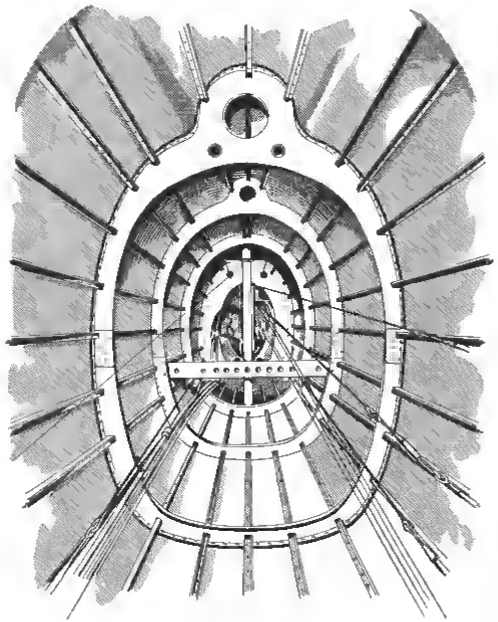




(above) View underneath Summit HM-5 showing 'A' landing gear retracting torque tube 'B' the main spar fitting (static tested to 250 000 lb. bending load) "C" landing gear knee and gear quadrant. 'D' rudder cables. "E" the stick control elevator horn and "F" the molded gear well rib for landing gear retraction.

The cowl of the Fleetwings Trainer Model XBT-12 (left) is attached to the mounting ring 'A' by means of the assembly 'B' attached at four points around 'A' by means of Dzus fasteners. The cowl sections are easily removed for engine inspection.

Fuselage of the Vought-Sikorsky V-143 (below) is of semi-monocoque construction with channel type frames spaced at approximately 14" intervals supporting outer skin covering. The skin is supported longitudinally by extruded aluminum alloy stiffeners spaced approximately 5" apart. The longitudinal stiffening angles are held in place by the same rivets which tie the side plates together, so that each skin plate is stiffened along each edge.



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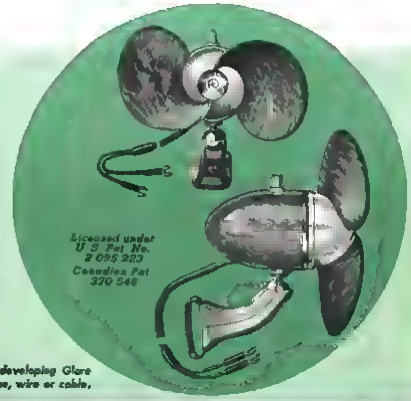

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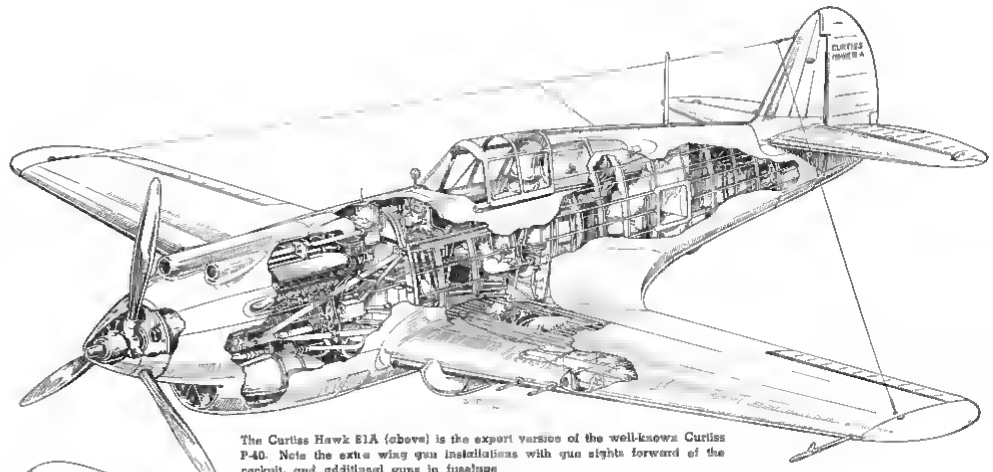
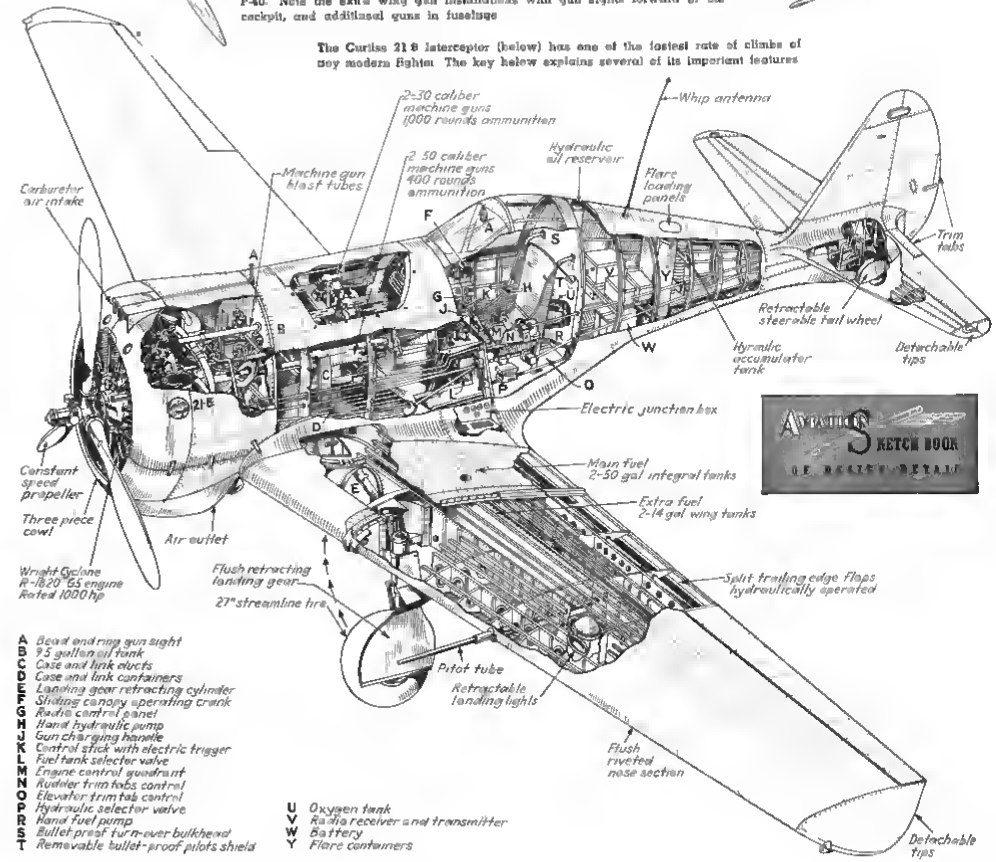


The Curtiss Hawk 81A (above) is the export version of the well-known Curtiss P-40. Note the extra wing gun installations with gun sights forward of the cockpit, and additional guns in fuselage.

The Curtiss 21 8 interceptor (below) has one of the fastest rate of climbs of any modern fighter. The key below explains several of its important features.



A Bead and ring gun sight
B 95 gallon oil tank
C Case and link chutes
D Case and link containers
E Landing gear retracting cylinder
F Sliding canopy operating crank
G Radio control panel
H Hand hydraulic pump
J Gun charging handle
K Control stick with electric trigger
L Fuel tank selector valve
M Engine control quadrant
N Rudder trim tabs control
O Elevator trim tab control
P Hydraulic selector valve
R Hand fuel pump
S Bullet-proof turn-over bulkhead
T Removable bullet-proof pilots shield
U Oxygen tank
V Radio receiver and transmitter
W Battery
Y Flare containers

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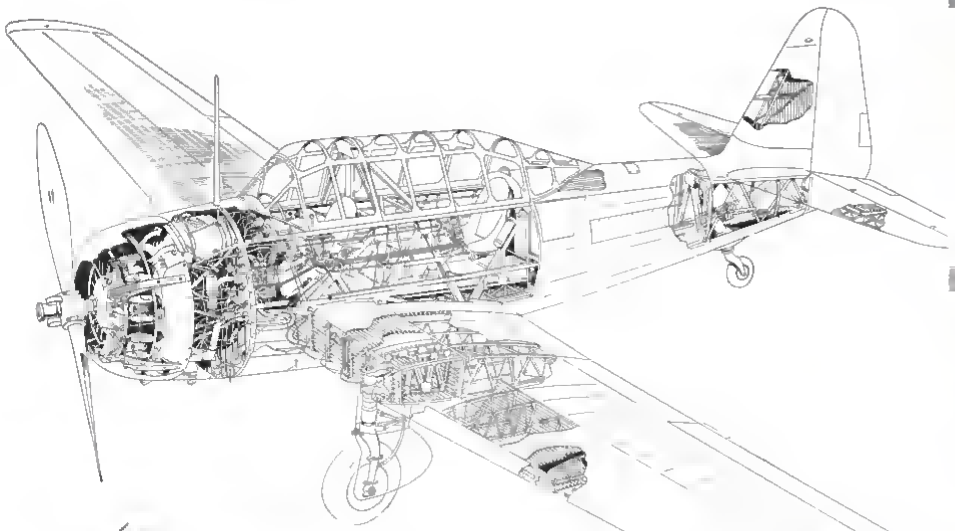
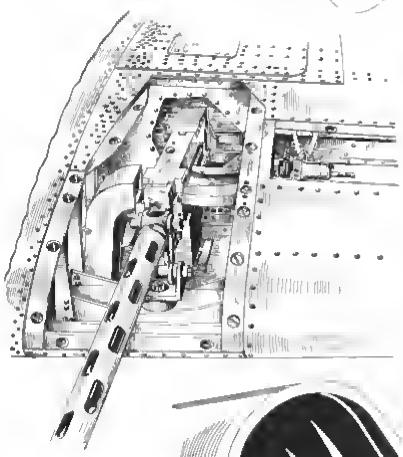
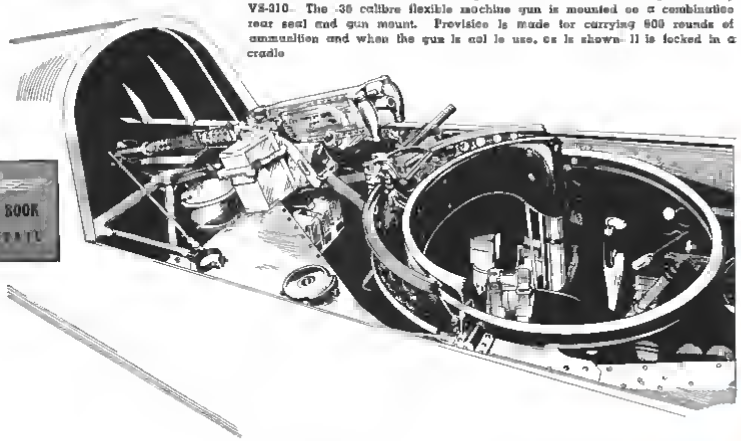




The Fleetwings Trainer Model XBT 12 (above) is of almost 100%-stainless steel construction. It has a double spar wing center section and a single spar outer wing panel which is detachable just outward from the landing gear. The ship is extremely sturdy in construction and affords exceptionally good visibility to facilitate student instruction. Note the use of corrugated stainless steel to take the main loads in the wing and tail surfaces. (See pages 120, 122, and 124 of the Sketch Book for additional detail drawings.)

The .30 calibre machine gun (left) is installed in the Republic EP-1 Pursuit and is capable of carrying 1000 rounds of ammunition. The container at the right is the ammunition box feeding cartridges into the gun through the chute. The link ejection chute is located just to the left of the gun. Note that the gun has had to be inserted through a hole in the wing spar.

Below is a view of the flexible gun installation in the Vought Sikorsky VS-310. The .30 calibre flexible machine gun is mounted on a combination rear seat and gun mount. Provision is made for carrying 600 rounds of ammunition and when the gun is not in use, as is shown, it is locked in a cradle.



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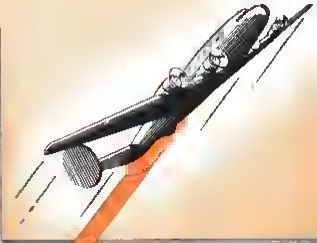
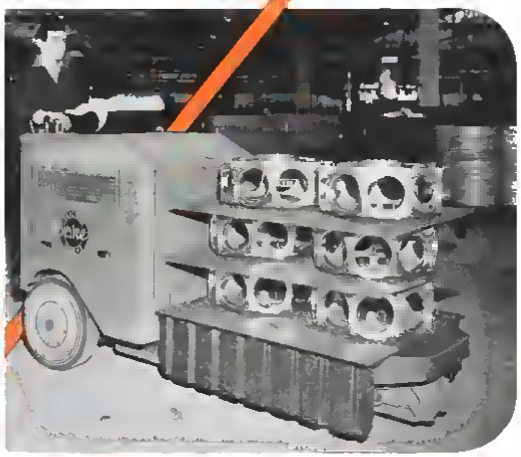
step up production in aircraft plants



BAKER TRUCK AT NORTH AMERICAN (Right) Changing and moving dies is a much faster, simpler and safer operation with this 6000 lb. capacity Hy-Lift Truck with die-pulling winch, in service at the North American Aviation plant at Inglewood, California.

BAKER TRUCK AT WRIGHT AERONAUTICAL (Below) Six radial engine crankcases are handled easily with this Baker Low-Lift Elevating Truck — one of 8 in service at the Wright Aeronautical Corporation, Paterson, N. J.



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The Piper Cub Coupe Model J-4 is shown above in cut-away. Here is shown the welded steel tube fuselage construction and the two place side by side dual control arrangement.

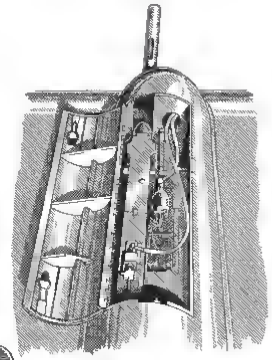
The Naugle Model Mercury employs a novel wing spar and rib construction shown above and below. The wing spar is made up of two main spar sections joined by X members around which the ribs are built attaching fore and aft as shown.

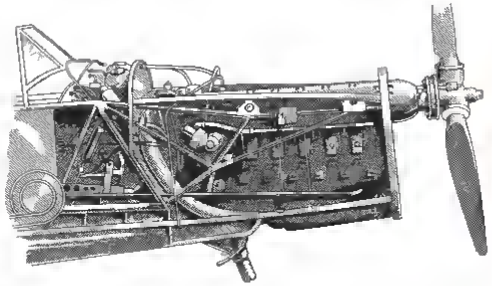
A Continental engine is shown above installed in a Piper Coupe, whose cut-away drawing is at the top of the page. Notice the exhaust system.

Another view of the Naugle wing spar construction

A cut-away drawing is shown below of the Taylorcraft BL-T. The key at the lower right explains several of the details of the ship

A - Landing gear with replaceable bronze bushings
B - Four longeron fuselage
C - Rubber mounted gas tank
D - Flexible steel control cables
E - All metal rib construction
F - Reinforced spruce spars
G - Nicralumin leading edge
H - Strut fittings
I - Balanced type aileron
J - Tail spring

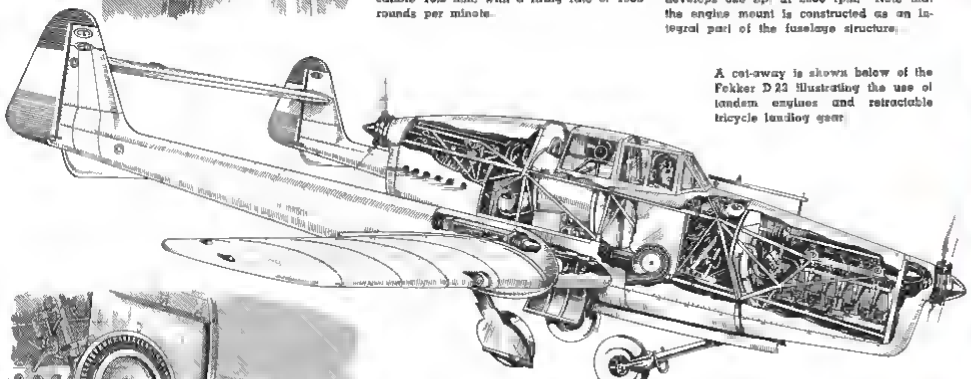


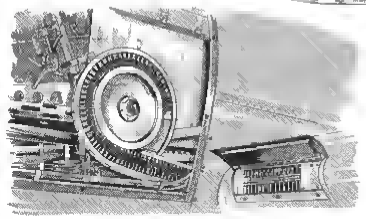


The wing boom gun (left) in the Fokker D.23 (below) uses Browning FN, shell guns, calibre 13.2 mm, with a firing rate of 1000 rounds per minute.

The front and rear engines in the D.23 are Walter Sagitta ISR engines, each of which develops 528 hp. at 2600 rpm. Note that the engine mount is constructed as an integral part of the fuselage structure.

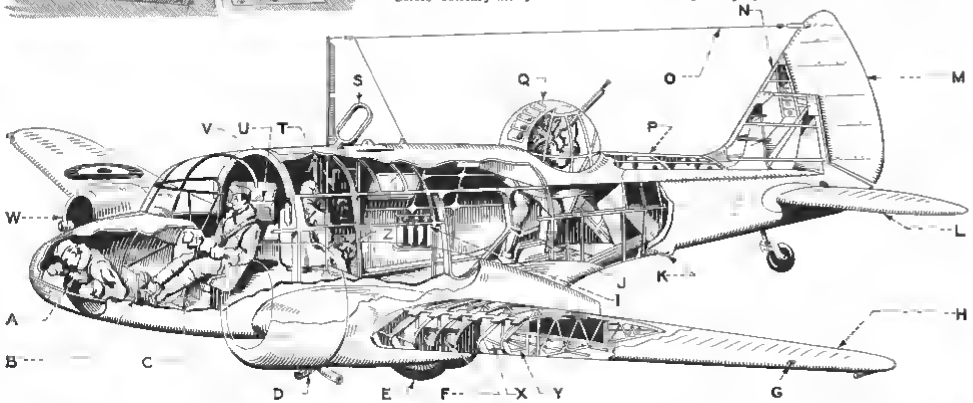
A cut-away is shown below of the Fokker D.23 illustrating the use of tandem engines and retractable tricycle landing gear.





The fuselage guns (left) are two synchronized Browning FN guns calibre 7.9 mm. with a rate of fire of 1300 rounds per minute. The cartridges are stored in the wings and follow this circular track before entering the gun.

A cut-away is shown below of the British Airspeed Oxford. This ship is an "All Purpose" Trainer and may be fitted for practice bombing, radio, navigation and gunnery instruction; or advanced twin-engine flying training.



A- Bomb-aimer using sight through transparent panel
B- Pilot's feet guard
C- Pilot's flying controls, dual controls may be installed at starboard side for instructor
D- Air intake
E- Undercarriage retracted backwards into the nacelle
F- Landing lights
G- Navigation light
H- Plywood covered stressed-skin main wing
I- Oxygen stowage
J- Cabin door opening
K- Flare chutes
L- Plywood-covered fin and fabric-covered, wooden-frame elevator
M- Fabric-covered wooden-frame rudder
N- Fabric-covered, wooden-framed fin
O- Fixed aerial
P- Stressed skin plywood covered fuselage, some stringers have been omitted for clearness
Q- Removable revolving gun turret
S- Retractable D.F. coil aerial, loop half raised
T- Radio
U- Parachute stowage
V- Specially strong front bulkhead to protect crew in nose-over crash
W- Starboard engine in N.A.C.A. cowl, the port engine has been omitted to give a better view of the cabin interior
X- Fuel tank in wing between spars
Y- Spruce lattice rib and box spars shown in section
Z- Trailing aerial reel

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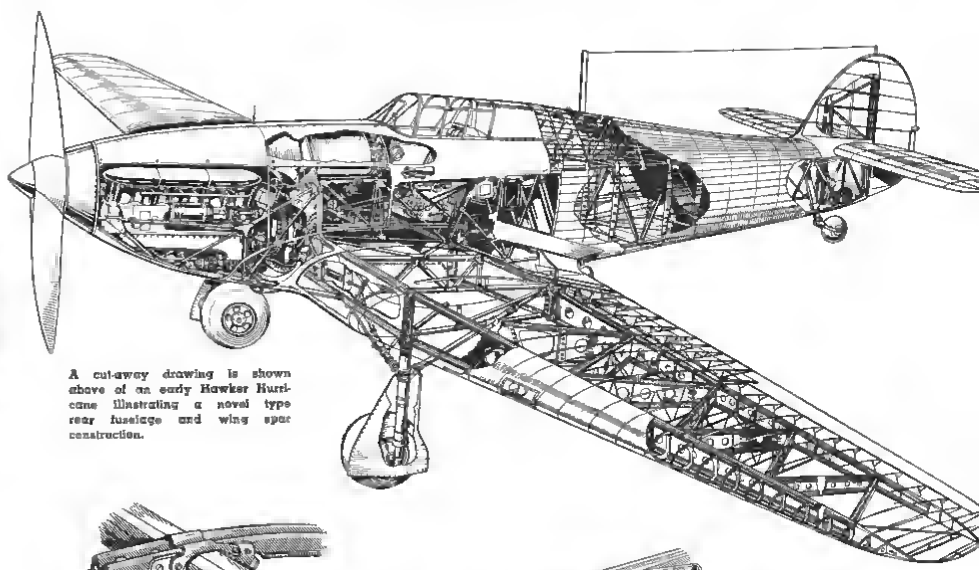
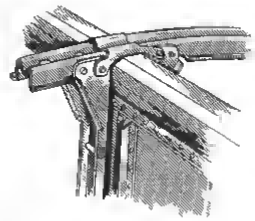
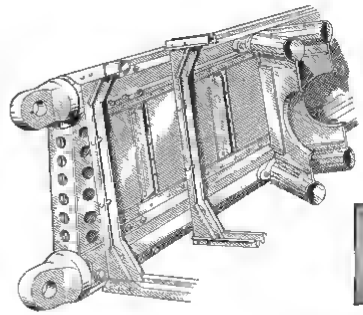
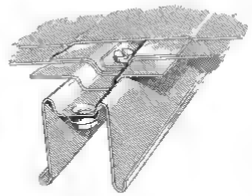


A cut-away drawing is shown above of an early Hawker Hurricane illustrating a novel type rear fuselage and wing spar construction.



The wing ribs of the Hurricane are attached to the wing spars by the fitting shown above.

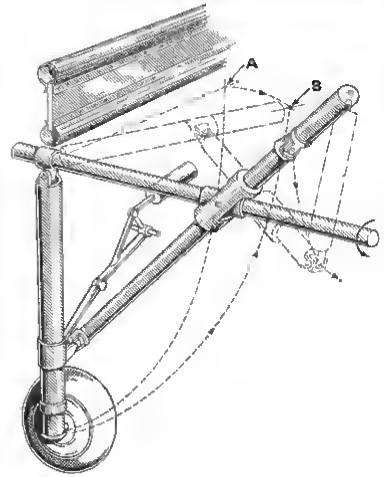




The skin is attached to the wing ribs by a very unique process illustrated above, with the wing spar being the bottom inverted U section. Immediately on top of this is placed a wide flanged hat section and in the center is placed a small lock strip, through all of these goes a bolt which fits into a nut, which is a permanent part of the bottom U section. Over all of this is then placed a final covering to give a smooth surface.

The main wing spar of the Hawker Hurricane is made of two tubular sections on top and bottom joined by a stiffener reinforced shear web. The typical truss spar joint is illustrated here as well as the fittings for joining the outer wing panel to the center section.

The landing gear of the Hawker Hurricane is retracted as shown in the diagram at the right. By turning the horizontal torque tube, as shown, the wheel is swung first to position "A" then by further turning it is swung back to position "B".



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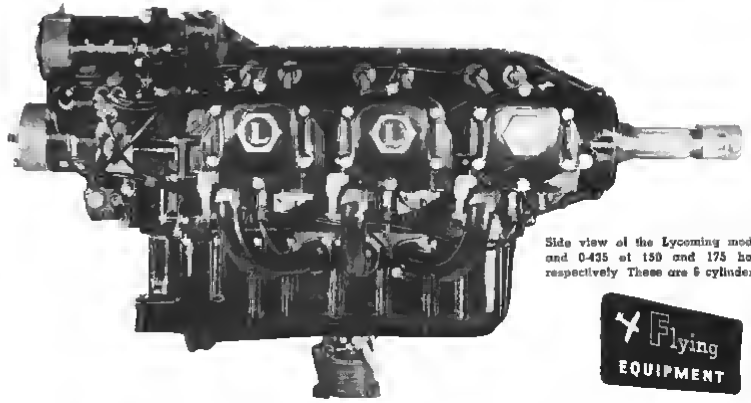


Side view of the Lycoming models O-350 and O-435 at 150 and 175 horsepower respectively. These are 6 cylinder engines.

Flying EQUIPMENT

4 New Lycoming Engines

From the Lycoming Division of the Aviation Manufacturing Corp., comes the announcement of four new horizontally opposed, air-cooled engines ranging from 100 to 175 horsepower.

Two of the recently announced engines, designated Lycoming O-235 and Lycoming O-290, have four cylinders and are rated 100 and 125 horsepower, respectively. Basically the same, these engines differ only in displacement. The other two new Lycoming engines O-350 and O-435, are six-cylinder, direct drive power plants of 150 and 175 horsepower with the same basic specifications excepting displacement.

Cylinder assemblies of the new engines consist of aluminum cylinder heads, screwed and shrunk to steel cylinders. Cooling fins are integral with the cylinder head casting and the cylinder barrel. The cylinder assemblies are fastened to the crankcase by means of studs and nuts. Each cylinder is equipped with two spark plugs located on opposite sides of the cylinder and installed in aluminum bronze spark plug bushings which are screwed and shrunk into the cylinder head.

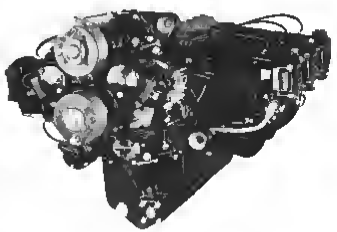
The crankcases of these new Lycoming engines consist of two aluminum alloy castings, split on the vertical centerline through the crankshaft bearings. Four copper-lead, steel-back, precision type main bearings are used on the four-cylinder models while the six-cylinder models have an additional ball thrust bearing at the forward end of the case. The two halves of the crankcases are secured by means of studs and nuts and are heavily ribbed throughout for maximum strength.

Pistons are of aluminum alloy, heavily ribbed under the head for maximum strength and heat dissipation. Each piston is equipped with two compression and two oil-control rings. Full-floating piston pins are 1¼ inch in diameter and have aluminum alloy retaining plugs.

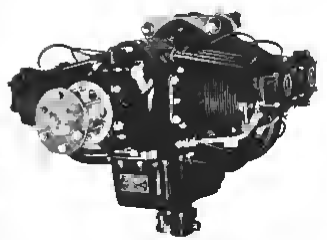
The fuel induction system consists of a single-barrel carburetor of suitable size fastened to the bottom of the oil sump. The distributing zone of the induction system is integral with the sump casting and is submerged in oil to provide sufficient heat to the fuel mixture for satisfactory distribution and cold weather operation. All models are equipped with dual magnetos which are spur gear driven from the timing gears.

Lubrication is of the full-pressure type including valve mechanism. Crankshaft is equipped with centrifugal sludge removers on all crankpins and pistons, piston pins and accessory drive gears are lubricated by splash. Oil capacity is 8 quarts for the four-cylinder and 12 quarts for six cylinder models.

Drives for dual magnetos, starter and single tachometer are standard on all the new Lycoming models. In addition, drives for fuel pump, vacuum pump, generator and dual tachometers can be supplied as optional equipment. (For complete specifications see tables page 113.)



Three-quarter rear view of the Lycoming engine models O-350 and O-435.



Models O-235 and O-290, 4 cylinders opposed, at 100 and 125 horsepower respectively.

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In factory, hangar and field, the "Clarktor-6" tow ships about deftly, swiftly, safely. Easy and simple to operate, gas-powered for 24-hr. service. The U. S. Army uses 1500 of them for handling airplanes! Ask for "Clarktor-6" Bulletin.

Write also for "Clark Fork Truck Bulletin, describing lifting, carrying and tiering finger trucks for handling motors and other parts in receiving, storage and production departments.

CLARK TRUCTRACTOR

Div. of Clark Equipment Co.

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"Clarktor-6" Tractor towing North American Aviation Company's B-25 Twin Engine Bomber on flight ramp, Inglewood, Calif.

THE AVIATION NEWS

BLAINE STUBBLEFIELD, Washington — C. F. McReynolds, Pacific Coast — Jay P. AuWerter, New York — E. R. Lockin, New York — FEBRUARY 1941

Auto Firms To Contract With Plane Builders
4 Plants Will Assemble 100 Bombers per Month

Three hundred bombers a month about a year or more from now is what Knudsen's plan for utilization of unused automotive facilities seems to boil down to. When the plan goes into operation it will provide 100 a month each of Martin B-26 and North American B-25 two-engine bombers and Consolidated B-24 four-engine bombers. Output rates will doubtless be stepped up beyond these figures as the program gets farther along.

As the plan stands, the government will build and own at least four assembly plants. Martin will operate a plant at Omaha, and will take a contract from the Air Corps for some 4,000 B-26s. It will sub-contract manufacture of most of the parts to Chrysler Corp., which will use its existing machinery for the work and use vacant plant space to do sub-assemblies.

Similarly, North American will operate a Kansas City government plant and get its parts under sub-contract from General Motors; there is, of course, a close corporate connection between these firms.

The Consolidated bombers will be assembled in two plants at Tulsa and Fort Worth. That Douglas will operate these plants, under a licensing arrangement is not yet clear. Ford will make the parts for these ships.

Facilities of other automotive manufacturers will be brought into the program via sub-sub-contracting by the three auto firms. Chrysler, in particular plans to farm out a great deal of its work for Martin.

Farthest along of the new government-owned plants is the one at Kansas City which North American will operate. This will be a windowless, air-conditioned, fluorescent lighted, plant with more than a million square feet of floor and employing 10 to 15,000 men. After the war it will be used as an Air Corps maintenance depot.

Meanwhile, management brains, though not physical facilities, of the automotive firms are being drawn into manufacture of air cooled engines. Ford, Studebaker, and Buick are all in on this. Unlike the plane parts program, this work involves construction of entire new plants. Little attempt is being made to apply automotive technics; plants generally duplicate existing Pratt & Whitney and Curtiss layouts.

Three engine plant programs are in the Detroit area. Ford is farthest along with his $22,000,000 engine factory and magnesium foundry at Dearborn. He hopes to be producing Pratt & Whitneys by March, but there is considerable scepticism as to whether he can do

(*Turn to page 152*)

Harris & Ewing

PRESIDENT FRANKLIN D. ROOSEVELT has been authorized by the people of the country to build the biggest military force in the world. Largely upon the United States rests the responsibility for a combined British American air power that must overpower the Axis air arm if the Democracies are to win the war. Here you see the President on his recent visit to the Buffalo plant of Curtiss-Wright. He is talking to the 9000 employees over the speaker system.

MEET AIR MARSHAL Sir Hugh Dowding, chief of the RAF during the blitzkrieg of last September, now head of Britain's home defense air war. This picture was taken as the gentle-mannered Scot told Washington newsmen that Britain would stop Nazi night bombing by Spring; that RAF will hold control over the islands, which will prevent a German invasion. Sir Hugh is calling on American aircraft manufacturers, helping to coordinate production of the two countries.

Roosevelt Snggests CPT Changes; Cnts Bndget Expeet Militarizatinn; "Deferred Enlistment"

President Roosevelt at a recent press conference said that CPT students are not disposed to enter Service and that the training is not particularly adapted to military flying At the same time, publication of the President's Budget estimate of appropriations showed the CPT cut from $37,000,000 in 1941 to $18,000,000 for fiscal 1942

This combination of remarks and budget cut looks as if Army and Navy officers, unfavorable to CPT as a military adjunct, had sold the President their ideas It is known that some high Service officers opposed the CPT, but those in command until recently supported it Recent changes in the Air Corps command are noticed as possibly back of the President's new stand

Of course the Civil Air Administrator will plead before committee for reinstatement of the 1942 fund at something like that of last year Argument will be that here is a set-up of 700 air schools in 700 colleges, this plant by June will have given 90,000 courses to 70,000 persons, has turned out 50,000 student pilots 19 to 26 years old with two years of college; that the cutting of expensive attrition and giving so many a feel of the air, is well worth the low cost per individual. CPT was organized in accordance with Army-Navy views Obviously they have now changed their minds, or an opposing group has supplanted the approving group Either way, say friends of CPT, it looks like see-sawing at a bad time.

On the President's side, it can be said that CPT was set up as a military project in civilian disguise, because the public at that time would not have accepted training for fighting Now, the false whiskers are off Possibly it's a change of politics and not of training methods

Changes in CPT are suggested by National Aeronautic Association and others: higher powered ships for secondary; regular military discipline, legal obligation of graduates to join Service if called; physical standards at par with Service standards

In face of a real emergency, with a need for the fastest military training, regardless of cost and public opinion, authorities say that direct military action would be fully justified

Incidentally, the Air Corps and Navy would have no trouble getting plenty of grade-A pilot material under present physical standards, if the Government was willing to encourage men to leave school and jobs

Student accident insurance is down again, instead of $500 in hospitalization, the $9 premium buys $1,000 worth

Twenty South American college students in the US will be given the regular CPT primary course

The Boomerang Plane

Igor Sikorsky, engineering manager of the Vought-Sikorsky division of United Aircraft, has made several hundred test flights since last March in his VS-300 helicopter It has demonstrated its ability to rise vertically and obliquely, to fly forward, beckward, or sideways, and to hover over one spot in air ranging from dead calm to 25 mph

RAF Chief Talks

Chief Marshal Sir Hugh Dowding, head of the RAF in the blitzkrieg days of September, is contacting U S aircraft manufacturers

The blue-eyed, gentle-voiced Scot says the British have a defense against night bombing, which he thinks will be in full effect this Spring

Sir Hugh praised the Lockheed Hudson, which is being received and equipped with a turret which fires aft Martin medium bombers are going to the middle East The Curtiss P-40s are doing fine, with some modifications Douglas DB-7 is playing two roles in the fighting, he didn't name them

Bombers are flying the Atlantic all the time, Lockheed, Consolidated, and others He says any bomber can do it if part of the dead load is left behind

Sometimes a Nazi squadron follows one leader, but the Germans install excellent instruments in all their planes. Absolutely no inferior gasoline has been found in downed Nazi ships, but some strange stuff has turned up in German motor transport

Airplanes cannot yet be built on automobile production lines, too much advantage lies in design, radical design changes are necessarily frequent Standardization may come in some future war.

AC Flys Infantry

The fighting cocks of Europe, making a fine art of war, have worked ont some tricks we've done little or nothing about One of them is air transport of parachute troops and infantry. The Army is rehearsing them both now: parachuters at Fort Benning, Ga., and flying infantry at Fort Sam Houston, Tex

The idea in airplane soldiery is to land man and combat equipment on fields already captured by parachuters, or lightly held by the enemy Troops must have subsistence and ammunition for 24 to 36 hours, according to *Army and Navy Journal*, until land support arrives

McCarran Proposes Independence for CAA Safety Board to NACA; Aholish Administratnr

Washington (AVIATION BUREAU)—Again, as anticipated, Senator McCarran has moved to restore the Civil Aeronautics Authority to an independent status outside the Department of Commerce He proposed the reorganization in Senate Bill No 1 of the 77th Congress

This legislation would aholish the Administrator and transfer his functions to the chairman of the re-instated five-man Civil Aeronautics Authority The chairman of the Board would appoint an Executive Director, within the Board, to whom could be delegated any or all of the administrative functions to be transferred to the Board.

Functions of the recently-abolished Air Safety Board would be given to the National Advisory Committee for Aeronautics, on the ground that it is a body of highly-respected aeronautical authorities The Safety Board within NACA would be completely independent of the CAA

McCarran will tell Congress that 473 persons were killed under Commerce air regulation between 1927 and June 1938, that for 17 months under the Safety Board there were no fatalities, that since Commerce again acceded to authority in June 1940, there have been four major accidents, killing 43 persons. He will try to show that the accidents are the result of politics.

NACA did not agree to accept the Safety Board; probably will testify against the wisdom of such a move, in fear of political troubles, which it avoids like the measles

Various Capital observers expressed opinion that Congress, anxious to preserve unity in the emergency, will hesitate to rebuff the President with Sen McCarran's proposal, but that any more accidents might tip the scale in his favor.

Wide World

THESE WOMEN will taur tha natian to mobilize a fleat af privately-owned planes for humanitarian use in countries at war and in disaster strikan sections of U. S. L ta R.: Marcedes Ormston, secretary of Reilaf Wings; Ruth Nichols, exacutiva diractar af Reilaf Wings; Lea Ya'Ching af China; Jana Hyde. All are pilats.

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WILLIAM E. SCHAEFER, in aviation since 1915, has been made general superintendent in charge of manufacturing operations for Republic Aviation Corp., under factory manager George A. Meyrer.

NEW VICE PRESIDENT in charge of sales for Aeronca Aircraft is Lee H. Smith, formerly assistant sales manager for Waco Aircraft, and sales manager for Vultee Aircraft.

CONGRESS HAS CONFIRMED the President's reappointment of Edward Warner, AVIATION'S former editor, as a member of the Civil Aeronautics Board. He will serve as vice chairman.

FOLLOWING the tragic death of W. J. Austin, George A. Bryant, executive vice president and general manager of The Austin Co. since 1930, has been elected to succeed him as president and general mgr.

Inst. Aero Sciences

THE ANNUAL SPERRY AWARD (to a young man for contribution to the advancement of aeronautics), was won by Dr. W. Bailey Oswald, of Douglas Aircraft, for studies in aerodynamics.

1941 OFFICERS of the I. Ae. S. are: Pres.: Frank W. Caldwell, above; V.P.s: H. L. Hibbard, W. A. M. Burden, C. H. Colvin, P. G. Johnson, L. D. Gardner, Treas.: G. Loening; Sec'y: C. E. Sinclair.

SUSY SWITLICK PARACHUTE & EQUIPMENT CO., has appointed Kenneth W. Wolcott sales and advertising manager. The Switlick factories have a $3,000,000 backlog.

APPOINTED ASSISTANT to the general manager of Wright Aeronautical, Rudolph F. Gegg will work on special projects. With Wright since 1930, he supervised construction of the Lockland plant.

FORMERLY MANAGER of the Technical Department of the Aeronautical Chamber of Commerce, Robert W. Ayer joins the executive staff of Fleetwings, Inc., as assistant to the president.

AFTER SEVERAL MONTHS' illness, Lawrence O. Quinther, manager of Goodyear's Airplane Tire Sales Division, died on Dec. 29. In the Air Service during the war, he was also an Air Race official.

A SEPARATE ORGANIZATION, the Aircraft Engine Division, has been created by Buick Motor Division of General Motors for the production of aircraft engines. Personnel of the new department have all been selected from within the Buick Co., affecting 40 key technicians, engineers and managers. Heading the project is D. E. Williams (l.), Buick comptroller, as operating manager, and J. G. Hammond (c.), Buick's general superintendent, as general manufacturing manager. Assisting Mr. Hammond will be R. H. Archer (r.), general superintendent, I. H. Larkin, assistant manufacturing manager, and James O'Neil, assistant general superintendent.

TRANSFERRED from the Buffalo division of Curtiss-Wright Corp. to its new 1,200,000 sq. ft. factory at Columbus, Ohio, are Stanley I. Vaughn and G. B. Clerk. Vaughn (l.), formerly manager of the experimental shop, takes over as factory manager. He has been with Curtiss continuously since 1915. Clerk becomes sales representative. An ex-Navy flyer, he joined the company in 1930, and in 1939 began tests on Curtiss Hawks for French delivery.

Empire Air Training

Orders now being filled by Australia's two largest plane manufacturers include 650 "Tigermoths" and over 800 "Wirraways" for primary and advanced training. In addition, a locally designed advanced trainer and a medium bomber are in the prototype stage, while it is expected that the Bristol "Beaufort" will be produced on a one-a-day basis before the end of the year.

While the Empire Air Training Program calls for 3,000 planes, 12,000 pilots and 26,000 ground-crew members during the first 3 years, Australia has already accepted 12,000 men for flight-crews, of which some 4,000 are in training, not only in Australia, but also in Canada and Southern Rhodesia. Of the ground-crews, some 13,000 are now in training, while an additional 5,500 are expected to enter schools before next spring.

Disagree on Airports

Big Expansion Doubtful

On the question whether this country's civil and military aviation needs a super-duper airport expansion program, experts disagree.

The Army has expressed interest in a program of about 600 new and improved civil fields. But it seems well enough pleased with the present schedule of 250. For a program of 200 fields, 12 of them in Alaska and Hawaii, the last Congress appropriated $40,000,000. The President's budget estimate for fiscal 1942, adds $33,000,000 more. About $80,000,000 are needed to do the complete job. WPA is supposed to make the difference. Of course, the actual appropriation may be vastly different from the estimate. The other 50 ports have not yet been provided for.

Civil Pilot Training has been put off of most fields where military and/or civil transport are operating. At least 25% of the nation's fields are closed to private flying.

The Air Corps has moved onto about 38 civil air fields.

Probably Army will not occupy any more civil fields as it stands organized now under the "54 group" setup. (A group is three squadrons. Two to four groups make a wing. There are 17 wings in the US and five outside continental limits, making 22 in all.) The Air Corps occupies in the US about 105 air fields of its own, and ten in Alaska, Hawaii, Panama, etc.

Washington authorities don't believe any extraordinary port expansion plans will be brought before Congress.

Calling Names

Pan American Airways has new executive offices at 1 "1 18th Street, Washington D. C.

Richard E Elwell, former attorney for Anthony Fokker and his company, is appointed chief attorney for compliance service of Civil Air Administrator.

American Airlines carried its 8,000,000th passenger. First in the world to do it.

Swedish Legation in Washington protests statements in AVIATION and other publications that their country is submissive to Germany. Sweden is arming to make a Nazi attack too expensive, wants more planes.

Pat O'Malley, CAA information assistant on vacation in Central America, getting dope for an air business book.

Railway Express offers 27 airplane trips totaling 27,000 miles in a sales contest among its 57,000 employees. Grand prize is round trip anywhere to anywhere in the U. S. for two, and all expenses for a week.

Eva DeMariano serves as special dietician for TWA's 17,000 service units between New York and California. Was with General Foods for ten years.

Alexander P. de Seversky was presented with the Harmon Trophy by President Roosevelt at the White House.

President W. A. Patterson of United Air Lines and **President J. C. Ward** of Fairchild Engine & Airplane Corp. were speakers at the January meeting of the Aero Club of N. Y.

G. R. Crone is appointed special representative, publicity Department, to handle cooperative advertising for TWA with headquarters in the Airlines Terminal Bldg., N. Y.

Dr. Hugh L. Dryden of National Bureau of Standards receives the Sylvanus Albert Reed Award from Institute of the Aero Sciences for contributions to the mechanics of boundary layer flow and to the interpretation of wind tunnel experiments.

Dr. Edward E. Miner, Jr., research and development engineer of Glenn Martin Co., is made chairman of the new Air Transportation Committee of the American Institute of Electrical Engineers.

John J. McCloy, World War Army captain, **Robert A. Lovett,** U.S.N.R. Lieutenant Commander in World War, and **J. H. Ambrey,** attorney, are named special assistants to Secretary of War Stimson.

Guy Vaughan, Wright Aeronautical's president, presented 20-year service pins to 84 employees.

Elmer P. Bruhn receives appointment to Purdue University as associate professor of aeronautical engineering. Was with Vought-Sikorsky since 1935.

Selig Altschul, AVIATION's regular financial contributor, becomes associated with Wiaibrop, Mitchell & Co. as independent consultant on transportation securities.

C. Harold Wills, in charge of Ford's Liberty engine production during World War, passed away on Dec. 30 at the age of 82.

Frank Mills, owner of Essington Aviation School and flight instructor during World War, died on Dec. 30 at the age of 45.

Capt. Garland Fulton retires from the Navy, was in charge of Airship Division, Bureau of Aeronautics since 1929.

Henry W. Roberts becomes Director of Public Relations for Lear Avia. at their New York City offices.

THE WASHINGTON WINDSOCK

By BLAINE STUBBLEFIELD

Jammed With Generals

A mee told us, in the Willard Bar, that efficiency of skilled labor goes down as the certainty of not losing jobs goes up. We pass it along as the only point not yet debated as to the cause of slow airplane production.

The reason why Pan American Airways released three 314 Boeing boats to Britain is that this model will be obsolescent by the time it's delivered. PAA loses three months on the deal, but gains by substituting new designs.

If you didn't know it, Pan American's China National lines were grounded because of war, and now they're up again. The reason is, less combat in that region. Call it Japanese weakness if you like to.

It the U. S. joins war doose, airlines to South America will be jammed with brig. generals, diplomats with pointed mustaches, and guys with brief cases. Airlines would rather build routine trade to keep in peacetime. Some think War Department should lend transport planes to help U. S. foreign and domestic lines to haul war priorities.

One day recently the British bombed in daylight more than a dozen points in Europe from Norway to the East Mediteranean. Nazis have advantage of concentrated target, but they have enormous expanses to defend.

Glider and sailplane training will be increasingly advocated as a pilot backlog builder, if priorities (to save aluminum and engine man-hours), are placed against flivver planes.

Mrs. Roosevelt hopes when the war ends we shall "have the sense" to say there shall be no more armaments. This is the first word of what many think FDR intends to try another League, this time with world police and no national armament.

Among the best adventure stories after the war will be the memoirs of pilots who are flying bombers over.

Hedy Arnold

NEW HAMMERHEAD PROPELLER, invented by Wm. H. Fletner, left, and Jim Serene. Claim is that unusual tip design gives greater travel to the tip and also permits extreme end of prop. to get a full bite. Plane is said to travel inside a "tube" of still air. Here Fletner holds a conventional propeller along side of new model. Inventors claim a 30 per cent increase in speed at same r.p.m.

Air Corps Expansion Program Completed 54 Combat Groups Nave All Types nf Plancs

Washington (AVIATION BUREAU)—Expansion program for the Army Air Corps, as planned early in 1940 is moving ahead On June 30, AC consisted of 3,322 Regular Army and Reserve officers, 1,864 flying cadets, and 45,814 enlisted men At that time an Air Force of 54 combat groups containing all types of airplanes was the goal, There were then 18 skeleton groups and wings In December, 1940, four Air District Headquarters were activated, together with 14 additional Wing Headquarters, which will handle the assignment of all personnel and planes in the 54-group setup Groups not already activated, were installed on January 15, 1941, formed from existing Regular Army units The Air Corps has expended since last June to 6,180 officers, 7,000 flying cadets, and 83,000 enlisted men

The complete personnel allotment under the 54-group setup is about 16,000 officers and 156,000 men It is expected that by June 30, 1941, 10,100 officers, 15,000 flying cadets, and 151,000 enlisted men will be in the Air Corps

Decentralization of training and inspection duties of the Commanding General and GHQ Air Force is provided for, and the development of commanders and staffs for special task forces in time of war is assured

Air District Headquarters Mitchel Field New York Tampa, Florida, March Field California and Spokane Washington Wing headquarters including those previously in existence will be at the following places Westover Field Massachusetts Michel Field, N Y Selfridge Field Michigan Langley Field Virginia and Bowmas Field Kentucky all in the Northeast Air District Augusta Georgia Savannah Georgia West Palm Beach Florida Tampa, Florida New Orleans, Louisiana, all in the Southeast Air District. Tucson Arizona Marsh Field Fresno and Hamilton Field California all in the Southwest Air District Spokane Washington Portland Oregon Salt Lake City Utah, all in the Northwest Air District. Air District Headquarters squadrons are given one officer and 63 men each and wing headquarters squadrons one officer and 25 men each to prepare for the arrival of complete headquarters.

The training of these new units will be under the direct charge of the Commanding General, GHQ Air Force, which comprises all four air districts.

Navy Needs More Planes and Pilnts

As the high command divided the United States Navy into three fleets Atlantic, Pacific, and Far East, Admiral John Towers, chief of the Navy air arm, told Congress the Navy expects to get 4,000 additional planes this year despite production delays He said that on January 1 the Navy had 2,590 planes on hand The additional 4,000 would run the total up to 6,590, but about 300 would have to be deducted for washouts and decommissionings Admiral Tower said he believed delays in producing aircraft are due to shortage of machine tools and the failure of subcontractors to fulfill their obligations

Meanwhile Rep. Melvin J Maas of the House Naval Affairs Committee says the Navy is short of training planes and candidates for flight training. He sees no hope for improved plane production unless priorities are given to planes over other armament Shortage of pilot material is due to too high requirements, he believes Mr Maas sees no reason why service pilots must have two years of college training He thinks more enlisted men should be trained as pilats, and will so recommend to Congress

AC Wants Engineers

The Air Corps announced training of specialists for commissions in squadron engineering, armament, photographic and communications activities. Status, pay, allowances, will be the eame as for cadets in pilot training Applicants must be un-married, citizens, age 20 to 26 inclusive, excellent condition

First choice for acceptance in engineering will be college graduates with engineering degrees, seniors in engineering will be second Training, which will take about nine months, will include theoretical and practical engineering in civil and Air Corps schools Subjects include aerodynamics, airplane design, engines and installation; engine lab, stress analysis; instruments; propeller design; structure and aerodynamics of military planes Engineering students will receive 12 weeks in either New York University or Purdue University Fifty applicants enter each school avery three months from January 1.

Armament and photographic schools will he at Lowry Field, Denver, and the communications school will be at Scott Field Illinois Requirements for these are a college degree together with some experience in the subject Applications for communications, armament, and photographic are not being accepted as yet

Pacific Air Fortress

So long as a strong Naval power exists in the Orient, Hawaii is one of the most strategic points in the Western Hemisphere The United States is taking advantage of this fact by rushing work on 17 Army and Navy air bases in the area These will constitute an almost impenetrable barrier to any hostile approach by sea or air The beses are distributed among the Hawaiian Islands proper and adjacent groups.

"Live Bait"

Associated Press the other day reported that the U S Navy is using manned targets for bomb practice. The targets are average-sized motor boats with deck armor and a turret for a crew of two A black stripe on the deck is the bull's eye for divers. Non-penetrating bombs are used, but the occupants said it was plenty exciting The idea is that men aboard maneuver the boats in the manner of enemy craft attempting to evade the bombs Target man and pilots exchange places for experience. The boats were seen on the way down the Mississippi.

Army Endnrance Run

Few countries have the problem of such long-range defense flying as has the United States Our Air Corps is by far the world's best in the art of military distance flying A new test of equipment and men was made early last month when a Boeing B17c made a 18-hour flight at a minimum of 15,000 feet. The crew of six carried oxygen masks. Physical reaction to the long grind was specially watched Distance covered was much in excess of 3,000 miles

Anti-bomb Plans

It is surprising how few predictions you find as to the extent "civilization" will dig in to escape air bombing Engineers say it costs so much to hury factories, hangars, and the like, that it may not be done extensively Anyway, the defense agencies of this country are working out long-range plans based on British experience These plans will be made available to local and state authorities. They include protection against fire, police and air warden duties, warning networks, shelter consttuction, wreckage removal, airfield and plant camouflage

100 Octane Gasoline

Aviation gasoline is among the least of defense troubles, but the industry thinks it might be well to expand a little in case consumption hy training planes and growing civil activities have been underestimated The blockade abroad has reduced export of 100 octane gas by about 44% If it were necessary to double present US production, it could be done in 12 months

THIS IS A COORDINATOR. It repraduces the cockpit of an Air Corps Training plane, burns na gasaline Thauaands of AC cadets will begin aerial careers an it. Invanted by H G Nicholeen of Cal-Aara Academy.

ROMEC Expands

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To aid in the Defense Program we are giving engineering consultation service on fueling problems on short notice, without charge. Your adoption of Romec Pumps now may save you difficultias and regrets.

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and self-defense in air combat . . . the new Martin B-26 "Flying Torpedo" for the U. S. Army, is now in mass-production. A streamlined, semi-high-wing, medium bamber . . . with retracting tricycle landing gear . . . two 18-cylinder, 1850-horsepower engines . . . gross weight of 26,625 pounds . . . the B-26 is the single mass-production type which Martin is manufacturing for the Army. Oefense is on the wing!

THE GLENN L. MARTIN COMPANY
Baltimore, Maryland, U. S. A.

Martin B-26 BOMBER

Builders of Dependable Aircraft Since 1909

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High stresses and severe weight limitations make material specifications for airplane structural parts and fittings exceedingly strict — which explains why Chromium-Molybdenum (SAE X4130) steel is so extensively used.

This steel has an excellent strength weight ratio and good fatigue strength. It is weldable by any process and welded parts can be used without subsequent heat treatment if necessary.

Write for our free publications, "Chromium-Molybdenum Steel for Aircraft" and "Molybdenum in Steel" for complete technical information.

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Fort Erie, Ontario, Canada

United States Becomes Sole Plane Buyer
May Curtail Profit, But Simplify Production

Washington (AVIATION BUREAU) —Political effects of the arms-loan program are of course immense, but what it will mean to the man who builds the planes will take time to reveal. It will probably mean less profit, many manufacturers have felt that however US orders might be hedged with restriction there would always be a profit in the British work. Now the US is the sole customer.

On the other hand, production problems should be simplified by the standardization as between British and US requirements that is certain to result. Where a production line is already set up on models used only by the British, manufacture will doubtless continue. But where this country and Britain are ordering substantially the same ship, the loan plan should end bickering over details of fitting and equipment. Technicians of the two countries will continue to dispute over major questions of design such as armament versus performance or hydraulic versus electric turrets, but the British will be in a much weaker position.

Meanwhile, problems of manufacturers dealing with this government have been substantially reduced by the drastic reorganization of the defense set-up which followed the hesitations and fears of late 1940. Details of procurement and all technical matters remain in the hands of the Army and Navy, and on questions of production policy and methods, manufacturers are now able to deal, in the Office of Production Management, with men having authority and the power to make decisions.

With significant exceptions, personnel of the production division of OPM is about the same as that of the old production and materials divisions of the Defense Commission. Removal of Stettinius from the raw materials assignment should mean a lessening of the tendency in that group to play down possibilities of shortage and an increased emphasis on expanded sources of supply.

More sweeping is the shift in the priorities set-up. The system of "voluntary" preference ratings administered by the Army-Navy Munitions Board continued without hiatus through the reorganization period, as did the simplified system for extension of the ratings to sub-contracts with the mere countersignature of the inspecting officer in charge of the contract.

But the handling of compulsory priorities is now in the hands of the Priorities Division of OPM under Stettinius—with the advice of a Priorities Board including all the defense bigshots. Within a few hours after its organization, Priorities Division had set up its system of industry committees for every product on which there seemed an immediate prospect of shortage.

A program had been set up, just before the President reorganized defense, to make the voluntary priorities compulsory in all but name by arranging to issue a compulsory rating whenever cooperation is not obtained under a voluntary rating. Abolition of the old Priorities Board and the Priorities Administrator shelved that plan temporarily.

(*Continued from page 141*)

it. The foundry is intended to have a larger capacity than the factory—in order to help relieve the general shortage of magnesium castings.

Another Pratt & Whitney factory is to be built by Buick in Grand Blanc Township, Mich., at a cost of $24,000,000. Studebaker is building $37,000,000 worth of plants for Wright engines at South Bend, Fort Wayne, and Chicago.

All of these plants are to be financed by the companies concerned. The cost will be repaid by the federal government over five years, after which title will vest in the government.

Liquid cooled-aircraft engines are still exclusively an automotive industry product, though P & W is reported experimenting with this type. GM's Allison Division has pushed production to about 300 a month and is hoping for a 1,000 in the summer. Building construction for Packard's plant for Rolls Royce Merlin engines is nearly complete, and about a third of the machinery is installed. Some preliminary parts are being produced, but it will be the end of the year before any significant output is achieved.

Three or four liquid-cooled engines are on the Detroit drafting boards, though only Ford has officially announced he is working on the problem.

The Reuther (500-planes-a-day) plane is definitely shelved, at least for the present.

MORE ADVANCED TRAINERS for both U. S. and Britain are lined up at North American ready for flyaway delivery.

Assembly Lines

By Robert Colborn

A big factor in the plane production lag at the turn of the year — when output dropped twenty percent below the previous August—was that the industry was in something like an automotive model-change.

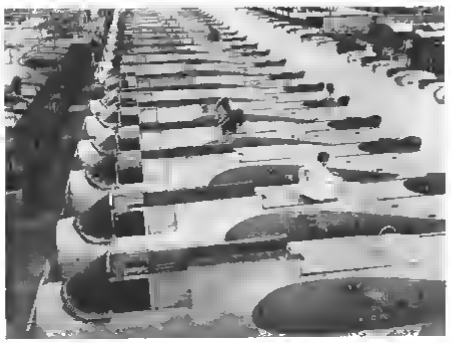
Martin has had to switch over from the French attack bomber, 167, to the Baltimore medium bomber for the British and the similar B-24 for Army. Moreover, the 100 ship a month assembly line for the French ships, idle since June is being started up on a somewhat modified design for the R A F.

Lockheed, too, which has attained an output of four Hudson bombers per day, is changing to a more advanced model of a design based on the Lodestar transport. Meanwhile, it is trying to get into production on the twin-engined pursuit, P-38E, lack of Allison engines, most of which are going into the Curtiss P-40, is a handicap.

North American is just putting the B-25 medium bomber into full production and is setting up a line for its pursuit ship.

Republic recently changed from the Swedish P-35 to a souped up version, the Lancer, and will soon switch again to the even hotter P-44, the mass production job for the Army.

Shortage of magnesium castings and aluminum castings, forgings, and tubular products is



LONG ROWS OF ATTACK BOMBERS move along on tracks at the Douglas plant as airplane production moves into high gear. Douglas engineers have devised many new production short-cuts in recent months.

Aircraft Steels for Immediate Shipment

Large and Complete Ryerson Stocks assure Prompt Delivery

S.A.E. 1035—Medium Carbon Bars—H. R. and Cold Fin.
S.A.E. 1095—High Carbon Bars & Sheets—H. R.
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W. D. X4130—Strip—Chrome-Molybdenum—H. R., Normalized, Pickled and Oiled
W. D. X4130—Cold Drawn and Annealed Chrome-Molybdenum Bars.
W. D. X4130—Heat Treated Bars—Cold Fin.
S.A.E. 4140—Chrome-Molybdenum Bars—H. R. and Cold Fin.
S.A.E. X4340—Chrome Nickel Molybdenum Bars—H. R.
S.A.E. 4615—Nickel Molybdenum Carburizing Bars—H. R. and Cold Fin.
S.A.E. 4815—Nickel Molybdenum Carburizing Bars—H. R.
S.A.E. 52100—Chrome Bearing Bars—H. R.
S.A.E. 6145—Chrome Vanadium Bars—H. R.
Allegheny Stainless—18 Chrome-8 Nickel Corr. and Heat Resist. Steel-Bars and Sheets.
Allegheny Stainless—12-14% Chrome Steel—Sheets
Seamless Structural Tubing—S.A.E. 1015—Carbon Steel.
Seamless Structural Tubing—Chrome Molybdenum S.A.E. X4130
18 Chrome-8 Nickel Seamless Drown Tubing.
18 Chrome-8 Nickel Welded Corrosion and Heat Resisting Tubing.
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AMERICA'S No. 1 STEEL STOCK . . . for complete wide range of sizes, for large tonnage, and for high, uniform quality! More than 10,000 kinds, shapes and sizes, including many special analyses recently added to meet rigid Government specifications, are at the immediate service of the Aircraft Industry. Practically all orders shipped the day received. For quick action on alloy and carbon steel—phone, wire or write the nearest Ryerson plant! Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Philadelphia, Boston, Jersey City.

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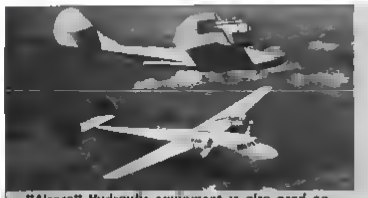
RYERSON

Pit work together....

ON THE HYDRAULIC SYSTEM OF CONSOLIDATED'S B-24

Thousands of hours were spent by the engineers of Aircraft Accessories Corp. in designing the specialized hydraulic units used in the Consolidated B-24 bombers. Much of this time was spent in collaboration with the engineers of Consolidated Aircraft Corporation—and both firms share the pride of this successful accomplishment.



"Airaco" Hydraulic equipment is also used on the Consolidated Amphibian Model 28, and Flying Boat Model 31.

Official U. S. Navy Photograph

The use of "Airaco" hydraulic actuating equipment in Consolidated B-24 bombers is the result of the development and research program continuously carried out by Aircraft Accessories Corp. "Airaco" engineers welcome the opportunity to aid manufacturers in the solution of their hydraulic problems, or to offer suggestions on the adaptation of hydraulic systems to their particular airplanes.

AIRACO

AIRCRAFT ACCESSORIES CORPORATION

166 W. OLIVE AVENUE • BURBANK, CALIFORNIA

WRIGHT AERONAUTICAL at Paterson, N. J., is now turning out a million horsepower a month in radial engines. This shows assembly of 1600-1700 hp. double-row Cyclones.

causing considerable embarrassment. In at least one engine plant the number of magnesium castings available is what determines engine output.

Supply of fabricated aluminum is tight, but defense officials think that by careful scheduling they can maintain plane production levels until new aluminum plants start operating this Spring. They are irritated when manufacturers cut production or complain to the newspapers in the face of material shortages without asking Washington for help. Northrop got a public reprimand for this.

Northrop is working on a single-engine patrol bomber, N-3, for the Norwegian air force (in Britain) and turning out one a week. Has 1,200-hp. Wright engine, 2,000-lb. bomb capacity and makes 235 mph.

Light plane builders are wondering whether they will be hit by the same restrictions that have been imposed on civil transports. Informal assurances come from Washington that they won't be forced out of business. But they are keeping a cautious eye on the Army and giving some thought to possible substitutes for aluminum sheet, of which they use a million pounds a year.

Consolidated facilities for manufacture of Navy patrol bombers are to be increased by $14,447,000 of plant, it will be built and owned by Defense Plant Corp., an RFC subsidiary and leased to Consolidated for ten years at a "nominal" rental.

Curtiss electric propellor capacity is to be increased by $14,000,000, probably to be government-financed on a five-year repayment "bankable contract." Curtiss has bought and will install machinery in the old Marmon plant at Indianapolis; the facilities at Caldwell, N. J., are to be expanded; and a new plant is to be built in Pittsburgh. Details have not been announced.

Ohio Crankshaft is to undertake a government-financed $4,000,000 expansion of facilities at Cleveland for manufacturing crankshafts for Wright engines.

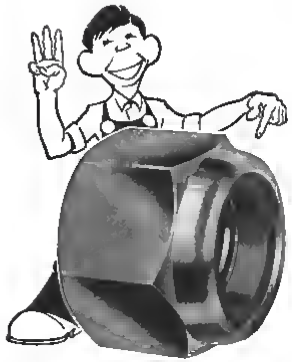
Republic has started work on a new plant, several times as large as its present buildings, to cost $5,000,000. The new Farmingdale, N. Y., plant will provide most of the capacity for Republic's pursuit plane production.

Trans-ocean Ferry Man

Importance of the trans-oceanic ferrying of military aircraft for Britain is emphasized by appointment of Gilbert L. Givvin, as representative of the Air Service Department of the Canadian Pacific Railway Company, to act as liaison officer between West Coast aircraft builders and the Air Service Department of the Canadian Pacific. Wing Commander J. R. Addams, RAF agent in Southern California, appointed Givvin.

Air Scout Sprouts

The Boy Scouts have Sea Scouts so why not Air Scouts? New York headquarters is reported considering plans for establishing ground school and flight training, in conformity with CPTP standards, for scouts between ages fifteen and eighteen who can pass the government physical examination.



THREE GOOD REASONS *for using Elastic Stop Nuts on aircraft fastenings....*

1. Sound in principle. A resilient non-metallic collar holds the threads of nut and bolt in a constant pressure-contact which can not be released by vibration, shock, or exposure to weather.

2. Proved in service. Now in their fourteenth year of successful use on aircraft, Elastic Stop Nuts have demonstrated their holding ability at every position... from instrument connections to wing fastenings... under all flying conditions.

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Catalog contains a graphic explanation of the Elastic Stop principle, presents test and application data, illustrates uses, and lists the complete line of nuts. **Write for a copy.**

ELASTIC STOP NUT CORPORATION
2320 VAUXHALL ROAD • UNION, NEW JERSEY

Elastic Stop SELF-LOCKING NUTS

Mnderate Expansinn nf Airlines and Serviees Provided for, Says FDR in Budget Message

The airlines are considerably encouraged over the prospect of getting airplanes for maintenance and some expansion The President, in his budget message to Congress said that the air mail estimates are based on expected moderate increase of routes and services. Also, the Priorities executives of the Defense Commission, in cooperation with Army and Navy, has decided to let Douglas have engines to power the transports to be delivered—approximately half of what the airlines wanted The original plan, to save engines for military purposes, was to lend engines which would fly planes to the purchasing airlines, remeve and retnrn them to be installed in military ships The idea was that the airlines would have enough spare and alternate engines to fly the new equipment. But this didn't work out Incidantally, under the present scheme, airlines are getting not only powered planes, but a few spare ongines. Opinion in Washingten is that the lines may do better than moderate expansion within a year or so

Plane Loeation Reeorder

An airplane locatinn recorder which enables ground crews to determine the position of planes in flight has been perfected by United Air Lines Work was directed by J R Cnnningham, director of communications

The recorder is the result of four years' research Various scientific gronps have tried for years to produce a unit which could be depended upon to function nnder all conditions

It lang has been possible to obtain position "fixes" in flight but heretofore it had been impractical to find direction from the ground while using the higher frequencies of two-way radio plane-ground telephone

For the first time a dispatcher can follow the course of an airplane, and be aware of any deviation from course This can be done withaut computations by the pilots, even without their knowledge.

A large frame antenna located atap a building is rotated by an electric motor Whan a ship transmits by short wave, the signal is received by the antenna Equipment in electrical contact with this antenna automatically indicates the bearing of the plane on a chart. Thus, the dispatcher is able to keep a running record of the plane's flight

Brazil Starts Line

Brasil is getting a new airline, financed and owned and operated by Brazilians This is the first line in that country not dominated by outside interests Terminals of the line, called Navegaçao Aérea Brasileira will be Rio de Janeiro and Fortaleza in North Brazil. Major Orsini de Araujo Coriolano is technical director

PAA Planes to Britain Ask Transoecan Rates

Pan American Airways agreed te transfer to Britain three of their six new Boeing flying-boats which are nearing completion at Seattle The transfer of course had to be approved by several US federal offices England was in serious need of planes to maintain the essential lines of Empire communication It is understood that Pan American has ordered twelve 76,000-ponnd 4-engined wheel planes from a West Coast manufactnrer

It is expected the Company will be ready to commence operation of six Atlantic rnnnd trips soma tima in Jnly The full schednle will not be flown unless traffic requires PAA may start third and fourth round trips in April, fifth in May, sixth in June

Rates asked of CAB for the service are $21,600 for the first two trips, for the third, $13,800, fourth, $9,000, fifth $8,500, sixth, $8,000 The maximum ontbonnd mail load is 1,800 ponnds, plus $4 for each ponnd in excess of that

All pilots including Pan-Grace, are spending four hours a month under the hood of a Link Trainar A special trade commission from Canada recently was good-willing aronnd South America via PAA lines

United Air Lines Flys Freight Trip

Freight service is operating on United Air Lines from New York to Chicago, one trip, late each evening For some time the late trip has been departing in two sections, both carrying passengers mail and express The company simply puts all the passengers on one ship and the cargo on the other Frequently the freight ship is so full that not even company parsonnel have been permitted to ride As yet, no certain ship has been stripped for freight The seats are covered and cargo is stacked over them When the ship reaches Chicago it is serviced and may go anywhare on the system with passengers This one-a-day freight trip is not very important in itself, but from it the Company is gaining valuable experience which it will use later when the air system carries cargo in special planes United is especially interested in cargo, has a staff of four, headed by Charlay Gradick, putting all their time on building freight and express business. At present goods can go by air in only two ways regular air mail rates, or regnlar air express rates

CAB in Alaska

CAB recommendations for dealing with applications for route certificates in Alaska were made pubhe December 17 The report does not include Pacific Alaska Airways, subsidiary of Pan American Airways, which now operates from Seattle to Ketchikan, Juneau, Fairbanks, Nome and Bethel, because this case has already been heard by examiners

Hearings on applications from 39 carriers were held in Alaska Tha cases stand for decision by the Board

Air Transpnrt Dnings

Northeast Airlines announces a new direct air service between Bosten and Moncton.

KLM West Indies Sectioo, is resnming its serviee between Curacao and Trinidad and Trinidad and Paramaribo

Mid-continent Airlines, Inc, gets a base rate of 34 cents per airplane mile for the first 300 ponnds of mail or fraction thereof, plus 2 5 percent of such rate per mile for each additional 25 lbs or fraction, on routs 48.

United Airlines gets CAB approval of applieation to include mail service to and from Philadelphia on its New Yark Oakland route

THE WORLD'S FIRST and onty airline terminal building opened in New Yark January 9 It's at Park Avenue and 42nd Street, naar Grand Central, higgest travel center in America

AIR TRANSPORT INDICATOR

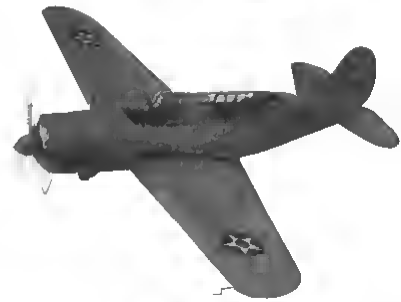
January 1, 1941

107.31

Which is the ratio of passenger miles reparted by the Air Transport Associatinn for all domestic lines for December 1940 to the figure for December 1939 Total for the indicator has continued its slump from the year's peak For the twelve months of 1940 traffic stood at 1 033 492 807 revenue passenger miles—up 7 3 per cent over November 1939

See Finance page for individual companies traffic figures

Curtiss SB2C-1 Dive-Bomber



THE latest Curtiss SB2C-1 dive-bomber, most formidable of a type pioneered by Curtiss, will endow America's aircraft carriers with deadly striking power With greatly increased speed, range, and armament, squadrons of these ships will play an important part in providing an airtight defense for the United States

Powered with a 1700 H-P Wright Cyclone 14, and equipped with a Curtiss Electric Propeller, the SB2C-1 has an exceptional reserve of power and range to extend the effectiveness of its scouting and bombing missions Like all modern Curtiss airplanes for both the Army and Navy, it is designed for mass production—in one of the three great factories with which Curtiss is augmenting its present extensive facilities for National Defense.

CURTISS AEROPLANE DIVISION
Curtiss-Wright Corporation • Buffalo, New York

The Curtiss SB2C-1 dive-bomber carries its bomb load fully enclosed for greater performance

Control Pulleys and Machined Parts for Aeroplanes!

BECAUSE it is much lighter than aluminum, strong, stable in dimensions and free from corrosion of any kind the aviation industry has found Formica to be a valuable material for a growing number of parts on aeroplanes.

It is widely used for control pulleys, fair lead bushings, machined parts for propellers, insulation for electrical systems, panel boards for instruments of either the fluorescent or ordinary type.

A very large percentage of the new planes taking the air make use of Formica in some one of these applications. One of the largest plants in the industry and a central location make Formica a desireable source of supply. Send your blue prints for quotations.

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HOW LIGHT PLANES AID PREPAREDNESS

Today — *right now* — America has more than 50,000 civilian pilots — pilots who received their essential primary training in *light planes*.

And hundreds of independent flying schools are training new thousands in *light planes* under the forward Civilian Pilot Training Program.

On the alert—this great army of civilian pilots is prepared to serve, within their capacity, in national catastrophes of floods, epidemics, *and defense*. Many are already in Army and Navy Air Corps — over 2600 CPTP graduates have enlisted and nearly 700 more are awaiting acceptance. Many others are building their flying experience in their own *light planes*.

Only with *light planes* can so many pilots receive primary training and multiply their experience so quickly. Only *light planes* can be built with the speed and in the quantity to provide adequate primary training facilities. The critical need for combat ships demands all large, fast plane production capacity. Existing industry capacity for *light planes* is now over 12,000 planes annually. Low in cost, inexpensive to operate, *light planes* fit the civilian pilot's pocketbook for training—and *keep* him in the air.

Serving our Nation's defense still further is the employment and training of many workers to replenish the serious shortage of skilled labor. *Light plane* manufacturers are conducting Vocational Training Classes — teaching metal trades, tool and die work, welding, painting, motor maintenance and repair, and other skills so urgently in demand.

Yes—the *light plane* is vital in National Defense. It is helping to create a Nation of Pilots — it is keeping them flying and ready for emergencies — it is expanding airplane plant capacity and increasing the supply of skilled workers. We are proud of the leading role Taylorcraft Airplanes are playing in this indispensible phase of national preparedness.

TAYLORCRAFT AVIATION CORPORATION
ALLIANCE, OHIO

TAYLORCRAFT

AMERICA'S MOST MODERN LOW-PRICED AIRPLANE

NACA Makes Annual Report

The 26th Annual Report of the National Advisory Committee for Aeronautics was transmitted to Congress by President Roosevelt on Jan. 13. Because of the restricted nature of a large share of the research which is now being done, this year's report contained less detailed information than in many years.

Most important developments during the year were the beginning of building the new Ames Aeronautical Laboratory at Moffett Field, Calif., and the voting of funds for the engine research laboratories at Cleveland. By the end of the coming year NACA will have three laboratories in operation rather than one.

During the year demands were made on the Committee by both Army and Navy for new basic data to improve aircraft performance. The great expansion in airplane production called for new quantity production methods. Both military services stepped up their experimental airplane programs.

The trend in aircraft development, the Report points out, was toward the development of planes having higher speeds and greatly increased armament. NACA made many experiments in its full-scale wind tunnel. Trends toward increased speed and higher ceiling, toward larger and heavier engines, more armor and armament, brought a need for larger and heavier types of airplanes. These conditions established a trend toward higher wing loadings.

The committee reported it had spent much time studying the subject of compressibility shock encountered at high speeds. With increased wing loading, the study of improved high-lift devices and lateral-control devices other than ailerons has been extended. High speeds bring many attendant problems which the Committee studied, such as improved cowling and cooling of engines, the design of wing ducts, and of ducts for cooling engine auxiliaries.

Scientists at NACA have devoted much time to the study of airplane design as related to increased production in factories. Close cooperation is maintained with both Army and Navy in this respect.

As an example of research that has been of great value, the report cites the example of a new type of cylinder finning that carries heat away from cylinder walls so rapidly that the horsepower or an engine can be tripled. It was stated that the power of the present air-cooled engines can be increased from 2,000 hp. to 6,000 hp.

Budget Estimates, 1942 For Aviation Interests

The President in his annual budget estimates that the Federal Government will need the following appropriations from Congress for expenses in connection with Aviation over the coming fiscal year beginning July 1, 1941:

Army Air Corps: $1,641,641,000 in cash plus $328,328,995 in contract authority including $1,201,158,507 for 1941 aircraft contracts and $768,281 for contracts entered prior to July 1, 1939.

Navy Bureau of Aeronautics: $434,350,000 including $350,350,000 for construction of aircraft, $9,000,000 for continuing aviation development and $600,000 for travel costs including flight of new aircraft from plant to naval base.

Expediting production: $406,507,500 cash plus $194,967,500 contract authority to Secretary of War to speed production by constructing plants including aircraft plants. Of the above, $304,500,000 is to cover contracts authorized in fiscal 1941 appropriations.

Signal Corps: $46,281,944 for procurement of equipment and facilities including aircraft and radio supplies under fiscal 1941 contracts.

Marine Corps: total estimate $46,894,528.

Civil Aeronautics Administrator: $41,550,096 including $18,000,000 (tranchion of $18,000,000 from last year) for CPTP; $14,200,000 ($5,827,778 increase) for maintenance of air navigation facilities; $436,759 for technical development; $2,750,000 for enforcement of safety regulations; $300,000 maintenance and operation of Washington National Airport; $4,710,700 ($2,125,500 reduction) for establishment of air navigation facilities. In addition $30,000,000 was recommended for completion of the $50 airport development program. (To be augmented by WPA allotments.)

Civil Aeronautics Board: $1,706,275.

Domestic airmail: $31,286,927 (Increase of $540,128 over last year for moderate expansion.)

Foreign airmail: $10,707,507 (increase of $400,475.)

National Advisory Committee for Aeronautics: $4,067,800 (Increase of $1,702,900) for research including operation of NACA laboratories plus an additional $1,400,020 to continue construction of the Ames laboratory and $5,030,000 to continue work on the new engine laboratory at Cleveland.

Weather Bureau: $4,468,670 for weather aids to air navigation.

Coast Guard: $883,000 (to be available until June 30, 1942) for replacement and new airplanes and equipment.

Coast and Geodetic Survey: $182,000 for aeronautical chart projects.

Federal Bureau of Investigation: $3,759,000 (increase of $2,041,900) for investigations relating to defense.

Antitrust enforcement: $1,575,000 ($251,200 increase) for Thurman Arnold's division of Justice Department.

GEORGE ARENTS, JR., right receiving the Glenn H. Curtiss trophy from Carl Adams. George won the 10 lap race at the Miami Maneuvers in his Spartan plane at a speed of 172 m.p.h.

TWO WINNERS AT MIAMI. Miss Bobby Lupton exhibits the international trophy she won as women's aerobatic champion at the All-American Maneuvers. Jack Snodgrass of Waterloo, Iowa, has the Firestone Trophy which he won in a Taylorcraft.

Miami Maneuvers

More than 1,000 private planes were flown to Miami for the All-American Maneuvers for the three days beginning Jan. 10. Pilots from all points east of the Rockies flew to Florida for the annual show.

Mike Murphy of Findley, Ohio, won permanent possession of the coveted Freddie Lund Trophy by winning it a third time, after an amazing series of aerial acrobatics. Squeek Burnett, of Richmond, Va., who won the trophy in 1939, was only contestant besides Murphy to reach the finals.

George Arents, Jr., of Greenwich, Conn., who owns and manages the Armonk Airport in Westchester County, won the 50-mile Glenn H. Curtiss trophy race. Arents flew his Spartan Executive. Julian O'Neal won an all-Miami 10-mile race in a Luscombe at 92 m.p.h. Jack Snodgrass of Waterloo, Iowa, won the finals of the Firestone trophy race. F. H. Stark, also of Waterloo, won second place.

Edna Kidd, of New Orleans, won the Alcazar trophy race from a field of women pilots. She flew a Culver Cadet at a speed of 113 m.p.h. Catherine Rawls Thompson, famous swimmer, won second place in a Culver Cadet. Third place was won by Virginia Snadgrass, of Waterloo, Iowa, in a Taylorcraft and fourth place to Arlene Davis of Detroit who flew an Ercoupe.

A 25-mile free-for-all sportsmen's race was won by Joe Dyer of Winston-Salem, N. C. who flew a Beechcraft. Kea Olson of Racine, Wis. was second.

Intercontinent Plant

Work is progressing rapidly on the new factory being built by the Intercontinent Corporation at the 36th Street Airport, Miami. The new plant will be used for the production of a primary military trainer and for general aircraft sub-contracting. It is hoped that actual production work will start this spring.

The factory will be composed of three units: the main factory building, the office and engineering section, and a separate section to house a foundry, paint and dope shop, and a hammer and press room.

Fighter escorts are used by British in bombing raids for the first time.

Air Corps is flying pilotless planes by radio control, but only within sight.

Transatlantic speed record set by Capt. Pat Eves of London, ferrying bomber, had breakfast in Canada, tea in London. Reports say ship was Lockheed Vega Ventura.

Great Mason, CAB member, addressing Franklin Institute, Philadelphia, makes strong plea against curtailment of civil aviation in the emergency.

Edward T. Foxton is appointed manager, N. Y. office, FAA.

Piper Aircraft reported that 900 owners asked for free Gulf gas books for Florida trek.

How to get a job in Aviation is told by Charles S. Mattoon, personnel chief for Curtiss Aeroplane, in a new book.

All-American Aviation announces it will file with CAB for 7 air pickup routes covering 254 cities in New England.

Randolph C. Walker is elected chairman of board and president of Aircraft Accessories Corp. He has been influential in development of Vega Airplane Co., Menasco Mfg. Co., and Aircraft Accessories.

Commercial Aircraft Priorities Committee enlarged; includes Col. E. L. Lyons of Army, Col. Donald H. Conolly; and Merrill C. Meigs of Defense Commission.

Although air travel in December showed the sharpest seasonal decline since 1937, traffic ran about 7 per cent ahead of the same month in 1939. And for the year as a whole, preliminary estimates indicate that the domestic air lines flew 1,043,000,000 revenue passenger miles, as against 977,000,000 in 1939. New peaks were established in earning power as well as in traffic, with the industry showing a profit of about $7,500,000 last year—an amount more than twice that reported in the best previous year of 1939. Large further gains are expected in commercial air travel again this year but with equipment expansion programs somewhat restricted by the priorities board of the defense commission, the increase may not run as high as the better than 50 per cent gain experienced in 1940.

Brewster and Continental Air Lines are raising new capital, the latter company having registered 100,000 shares of common stock with the SEC while Brewster has arranged to raise $600,000 by the private sale of 50,000 shares of capital stock. Hayes Mfg. Corp. of Grand Rapids, Michigan, also has registered 300,189 shares of common stock with the securities commission.

Curtiss-Wright has the largest backlog of unfilled orders among the aircraft manufacturers while Bendix Aviation ranks first in the parts and accessory field. A rough breakdown of the Curtiss-Wright backlog of $500,000,000 shows that approximately 53 per cent are for the army, 33 per cent foreign war orders, 9 per cent navy and 2 per cent for commercial air lines. Nearly 40 per cent of the Bendix backlog of $95,000,000, represents direct U. S. Government contracts.

Here And There . . . *Piper Aircraft* recently had a backlog of 540 planes . . . *Solar Aircraft* has been approved for listing on the N. Y. Curb . . . *Engineering & Research Corp.* is producing approximately 90 Ercoupes a month, with a backlog of about $1,000,000 on hand . . . *Douglas* payroll in 1940 totaled $28,100,000, against $14,300,000 in 1939 and with completion of its Long Branch factory will have 40,000 employes with a $70,000,000 payroll . . . During 1937, 1938 and 1939 *Bendix* expended $6,256,000 on engineering and research, an amount in excess of annual profits for that period.

By Raymond Hoadley

Government financed plant expansion in the aircraft industry virtually will be completed towards the end of 1941 with peak production likely to follow early in 1942. Annual output at that time should be well past the two-billion-dollar mark as contrasted with estimated sales of $625,000,000 in 1940. Earnings this year bid fair to pass the high record established in 1940, unless that is, Congress decides to increase sharply a tax burden that already has placed a speculative ceiling on the price of aircraft stocks. Because of the extra conservative charges that will be made against plant expansion stockholders probably will receive a larger portion of remaining earnings than in past years. Meanwhile the commercial airlines are more worried over the procurement of adequate equipment facilities this year than they are over excess profits taxes—which in their case is substantially lighter than it is for the plane manufacturers.

. . . *Vultee* expects to produce 3,000 planes in 1941, as against 300 last year . . . *American Airlines* last December became the first domestic airline to carry 3,000,000 passengers . . . Air express shipments in 1940 reached the million mark for the first time . . . *United Aircraft* sales in 1940 totaled around $125,000,000, as compared with $52,000,000 the previous year . . . *Breeze Corp.* reported a $10,175,000 backlog of unfilled orders in December, 1940, as compared with $1,750,000 at the beginning of that year . . . Brewster is producing three planes a day and expects to double its output by fall . . . *Curtiss-Wright*, like its chief competitor, United Aircraft, had total sales deliveries of about $125,000,000 in 1940 . . . Earnings of *Continental Motors* for the quarter ended January 31, 1941, are estimated at $500,000, before federal taxes, in Wall Street circles . . . With sales estimated at around $10,000,000, as against $923,000 in 1939, *Republic Aviation* will report the first net profit in its history when the 1940 annual report is published . . . Gene Tunney recently purchased 1,000 shares of *Aviation & Transport Corp*, while James S. Ogelbury acquired 10,000 shares of *Fairchild Aviation Corp.*

Stainless steel is much talked of as a possible alternative to aluminum sheet if shortages get tighter or in the interest of easier mass production. North American's experiment with stainless on the wing and tail surfaces of BC-1 basic combat trainer rates considerable attention.

Furniture plant manufacture of parts is contemplated in the design of Fletcher Aviation Corp's plastic-bonded plywood trainer (primary or basic depending on hp.). A production test run of six planes is now in manufacture at Burbank.

Current Earnings Reports

Company					
Air Associates	12 mos. Sept. 30	$400,265	$128,938	$3.50	$1.08
Beech Aircraft	3 mos Sept 30	66 103	d31,478	0.17	
Bendix Aviation	9 mos Sept. 30	4,474,753	3 092 348	3.09	1 47
Cent L Motors	12 mos Oct 21	611,842	d215 164	0.20	
Eastern Air Lines	9 mos. Sept. 30	702 221	456,840	1 41	0.81
Interstate Aircraft & Engineering Corp	6 mos Oct. 31	38,252	15 003		
Kinner Motors	4 mos Aug. 31	386,307			
Taylorcraft	9 mos Sept. 30	50,635		0.31	

d—deficit

Industry Backlog

Unfilled orders of the aircraft industry are well above $3,600,000,000, as against $700,000,000 a year ago, and are at a new high record despite accelerated deliveries recently to the United States and British governments. The Navy still has large aircraft awards to make out of the 1940 congressional authorizations and the Dutch East Indies currently are negotiating for planes. Meanwhile, plans are shaping up between the government and the aircraft and automobile industries with respect to an enlarged United States-British aircraft program. It is not expected that the motor industry will contribute heavily to aircraft production until 1942 and by that time the aircraft industry may be the largest employer of factory labor in this country. The following table gives the latest approximate unfilled orders of 23 primary producers of planes and aircraft engines. The Buick division of General Motors Corp. and the Studebaker Corp. are constructing large plants preparatory to substantial orders from the United States Government for aircraft engines.

Allison	$105,000,000
Aviation Corp.	10,000,000
Beech	22,000,000
Bell	60,000,000
Boeing	206,000,000
Brewster	169,000,000
Cessna	11,000,000
Consolidated	320,000,000
Continental	45,000,000
Curtiss-Wright	500,000,000
Douglas	350,000,000
Fairchild	20,000,000
Ford	122,000,000
Grumman	60,000,000
Lockheed	290,000,000
Martin	225,000,000
North American	512,000,000
Northrup	27,000,000
Packard	219,000,000
Republic	60,000,000
Ryan	13,000,000
United Aircraft	430,000,000
Vultee	97,000,000
	$3,652,000,000

With the Airlines

Company	Revenue Passenger Miles* December 1940	December 1939	% Gain	12 Months 1940	12 Months 1939	% Gain	Revenue Passengers December 1940	December 1939	% Gain	12 Months 1940	12 Months 1939	% Gain
American	y21,930	20,672	06	x311,746	207,360	50	60,591	53,093	14	x870 030	541,757	60
Braniff	3,633	2,008	44	37,000	19,815	87	11,654	8,234	46	118 000	62 247	90
Chicago & Stin	1,070	922	13	16 076	9,242	74	2,554	2,237	14	41 875	23,353	79
Eastern	y13,500	9,124	48	x143 635	91,320	56	y31,000	21,894	42	x317,582	208,286	41
Northwest	y11,449	3,120	72	x59,787	34,749	73	5 934	9,901	—	x111,608	67,618	50
Penn. Central	2,362	1,835	28	37,579	21 193	77	12,292	10,550	13	210,436	122 303	72
T W A	y12,136	9,011	25	x145 519	90 169	37	y24,182	19,120	26	x297 305	181,079	54
United	15,823	12,151	23	226,000	140 000	52	y32,650	y24,099	35	x419,996	262,135	37

*000 omitted y—November x—11 months

Recent Awards

War Department

Glenn L. Martin Co., Baltimore, Md., $889,012 for maintenance parts for airplanes.

Fairchild Aviation Corp., Jamaica, N. Y., $8,619,844 for cameras, cone and magazine assemblies.

Curtiss-Wright Corp., Clifton, N. J., $03,202,820 for propeller assemblies and control sets.

Link Aviation Devices, Inc., Binghamton, N. Y., $4,097,412 for link trainers.

Irving Subway Grating Co., Long Island City, N. Y., $208,845 for airplane landing mat and steels.

Allison Engineering Co., Indianapolis, Ind., $09,532,895 for airplane engines.

Armstrong Brothers Tool Co., Chicago, Ill., $187,485 for socket wrenches and parts.

Weston Electrical Instrument Co., Newark, N. J., $110,728 for ammeter and voltmeter assemblies.

Weston Elec. Instrument Co., Newark, N. J., $383,985 for indicator and generator tachometers.

Navy Department

Grumman Aircraft Engineering Corp., Bethpage, N. Y., $20,275,805 for airplanes and parts.

Grumman Aircraft Engineering Corp., Bethpage, N. Y., $5,074,650 for airplanes.

Window Shopping

The following literature will be sent to any reader on request direct to the firm mentioned.

Precision products—A line of precision products including switches, resistors, condensers, volume controls and similar items is described in the new bulletin issued by P. R. Mallory & Co. of Indianapolis. Form M 770 A. 40 pages, 8½ x 11 in.

The Abrams Contour Finder—Pamphlet illustrating and describing Abrams stereoscopic contour finder for use in connection with aerial mapping. Abrams Instrument Co., Lansing, Mich.

Allis-Chalmers HD 7—A 24 page two color catalog describing the Allis Chalmers 54 hp. crawler type tractor. Allis Chalmers Manufacturing Co., Milwaukee, Wis.

Lynite Lo-Ex Aluminum Pistons and Cylinder Heads—A 44 page book dealing with aluminum alloy pistons and cylinder heads. Aluminum Company of America, Pittsburgh, Pa.

Anaconda Metals in the Aircraft Industry—A handsome 18 page manual of copper and copper alloy stock materials currently used in aircraft and aircraft engine manufacture. The American Brass Co., Waterbury, Conn.

American Bonded Metals—A series of five folders dealing with various types of nickeled parts. American Nickeloid Co., Peru, Ill.

Bacharach Type 2-CP Engine Indicator—Bulletin 270. Bacharach engine indicator Type 4 MS—Bulletin 281. These bulletins describe high speed engine indicator equipment. Bacharach Industrial Instrument Co., 7606 Penn'a St., Pittsburgh, Pa.

Chemical Rubber Group No. 2 on "Glycols"—Covers characteristics of liquid coolants and other glycol compounds. Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York, N. Y.

Despatch Finish Baking and Drying Ovens—A 12 page catalog dealing with lacquer and enamel baking equipment. Despatch Oven Co., Minneapolis, Minn.

DuPont Plastics Bulletin No. 7—An interesting folder panelled for loose leaf binding dealing with recent applications of molded plastics. Plastics Department, E. I. duPont de Nemours & Co., Inc., Arlington, N. J.

Pneumax Agitators—A 4 page folder describing air motor equipment for mixing lacquers and paints. Eclipse Air Brush Co., Inc., 390 Park Ave., Newark, N. J.

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On Schedule

By "Vista"

Even in these times of war, Pan American Airways continues to hold the American flag high in the air—plans have been made public recently that three new extensions can be expected in the near future, linking vital points of the British Empire and providing an improved Trans-Atlantic service. The new routes are (1) a Southern Atlantic service via Bolama (Portuguese West Africa), Port of Spain and San Juan to New York, (2) a line to Capetown via the West Coast of Africa and (3) extension of the Trans-Pacific route to Singapore.

Of these new lines, those to Singapore and Capetown vie with each other in importance. The service to Singapore, reliably reported to be in answer to State Department wishes, will form a link with the extensive British and Dutch airnets in the Far East, India and Australia. In addition, it will eliminate complications which might arise if the Dutch were granted their long-sought-after permission to fly into Manila, while the Japan Air Transport Company did not receive this privilege. By this move, the necessity of a direct connection between Manila and Batavia has been completely eliminated, and it seems improbable that further action will be taken in this matter.

Singapore, already an important link in the international airline system, will gain in importance when it becomes a terminal for P.A.A.'s Pacific service. Actually, these plans are of prime interest to both the East Indies and India, Australia is already directly served by the line to New Zealand, from where Tasman Empire Airways and other Australian lines give through connections to all important cities on the Sixth continent.

From Capetown, where the new line to South Africa will have its terminal, most of East Africa, the Near East and India will be served by British Overseas Airways, thus opening faster connections to and from the Western hemisphere. At the same time, an alternate route to England will become available via Egypt, from where there now is a regular, but unpublished airline to the British capital. Actually, the plans for an airline down the West Coast of Africa are not new; in 1938 plans were completed for a joint service by British Airways and the Holland K.L.M., and the latter made several survey flights with passengers to Capetown.

The service over the Southern Atlantic, which for the time being will only be flown in Westerly direction, will circumvent the trouble at Horta, where the sea is all too often too rough to permit the heavily laden Clippers to take off. Recent survey flights were made between New York and San Juan, while further tests between Trinidad and Bolama will undoubtedly follow shortly, as soon as the equipment is available and base facilities have been completed.

The disruption of the Atlantic services by sea conditions has been quite noticeable during recent months—the release of three of the new Boeing 314As to Britain did not come as a surprise, and further emphasizes the trend away from large flying-boats. This trend was heralded quite some time ago by the announcement of a 3-hr. landplane service to Honolulu, was further stressed by replacing the old Clippership in South America by DC-3s and the new service to Buenos Aires with Stratoclippers, and will shortly again break into the headlines when the purchase of about a dozen large landplanes in the 80,000 pound class is announced.

The airport at Lisbon was developed with an eye on Trans-Atlantic landplane service; another large airport is available on the Island Sal in the Cape Verde Group, while there are any number of airports in the United States and Latin America which are suitable for 40-ton landplanes, including the reported airport development at Bermuda.

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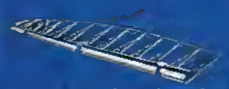
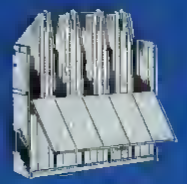


This aileron for a Seversky P-35 pursuit plane of the type shown at the right is a light, strong structure of spot-welded 18-8 stainless steel.



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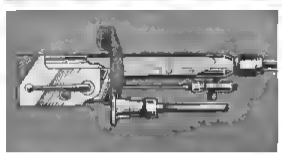
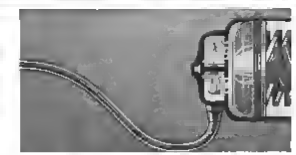
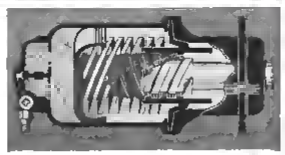


1 *Fuel charge contained in the cartridge is electrically ignited in the starter breech, which is usually conveniently located in the cockpit*



2 *Initial pressure propels ignited fuel through stainless steel intake tube to combustion chamber in starter, where combustion is completed*



3 *Pressure actuates piston, producing, through helical splined shafts, rapid acceleration of the engine. Automatic valve releases pressure*

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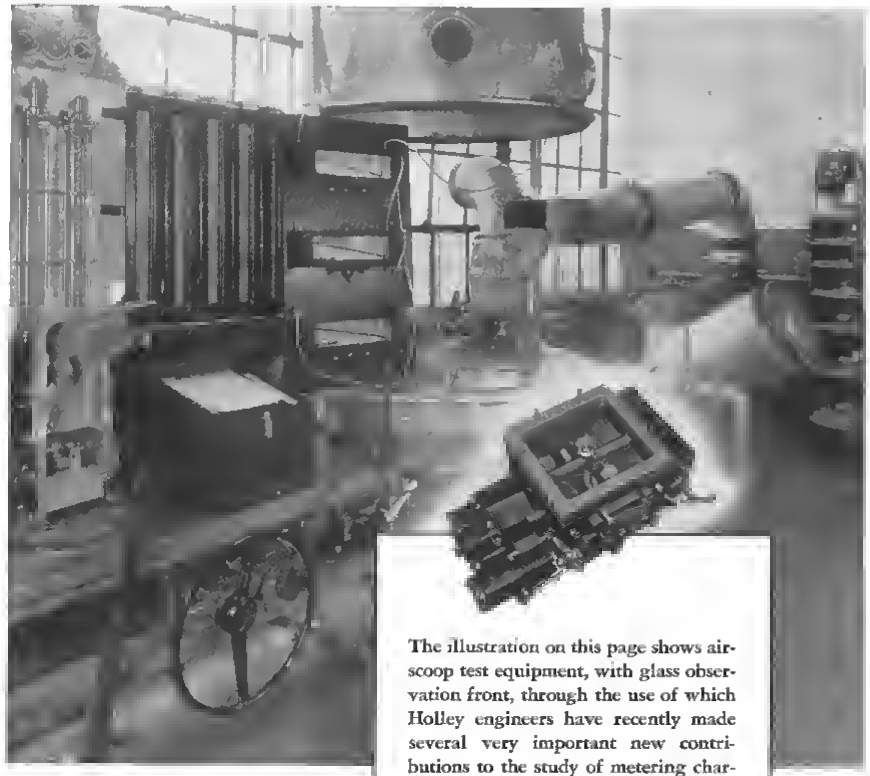

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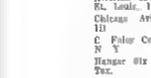

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Innes, Casey School of Aeronautics Inc., 334 Broad St., Newark N. J.

Kirk Airmotive, Box 294 Anchorage Alaska

Kranko Aeronautical Service, Port Erie Airport, Erie Pa.

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Lange Aviation Corp., P. O. Box 1098 Milwaukee Wis.

Lacey Aircraft, Inc., Ancevelt Field, Hicksville, L. I., N. Y.

Lincoln Airplane & Flying School 3415 "O" St. Lincoln, Nebr.

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Lockheed Aircraft Corp., 1705 Victory Pl., Burbank Calif.

Long Airmotive Inc., Ltd., San Francisco Bay Airdrome Alameda, Calif.

Louisville Flying Service Inc., Bowman Field Louisville, Ky.

Manhattan Oleh School of Aviation Trades, 220 E. 63rd St. New York N. Y.

Marston Flying Service Concord Airport Concord, N. H.

Eastern Airmotive Aircraft Corp. Allegheny County Airport Pittsburgh Pa.

Grocery Aircraft, Inc., Wheeler Ave., Hammondsport, N. Y.

Meisi Aircraft Welding Co., Building 20 Roosevelt Field Mineola, L. I. N. Y.

Meyer Flying Service, 913 Boulard St. Greenville, N. C.

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North Dakota State School of Science, Wahpeton N Dak.
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Northwest Air Service Inc., Boeing Field, Seattle, Wash
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Note.—To conserve space the various courses offered by the schools listed below have been keyed as follows:

A—Airline Operations
C—Correspondence
E—Engineering
F—Flight
I—Instruments
M—Sheet Mechanics Courses, such as welding, sheet metal blueprint reading etc
MM—Master Mechanics Courses for A & E Licenses
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O—Other Miscellaneous Courses

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M

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(Continued on page 324)

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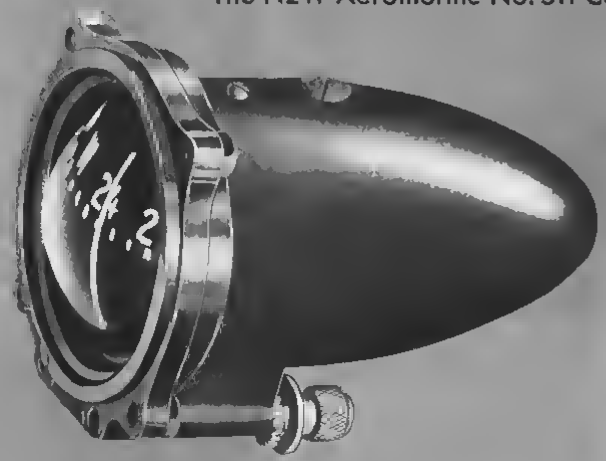

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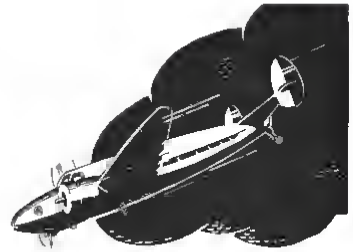

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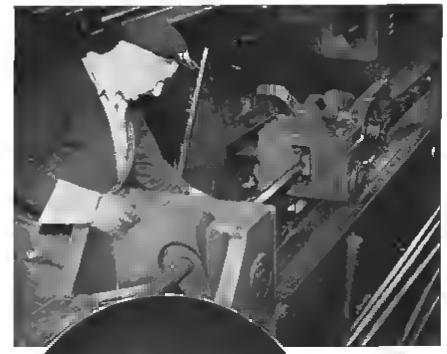

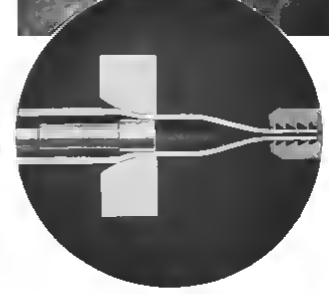

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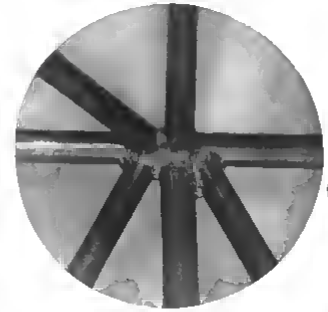

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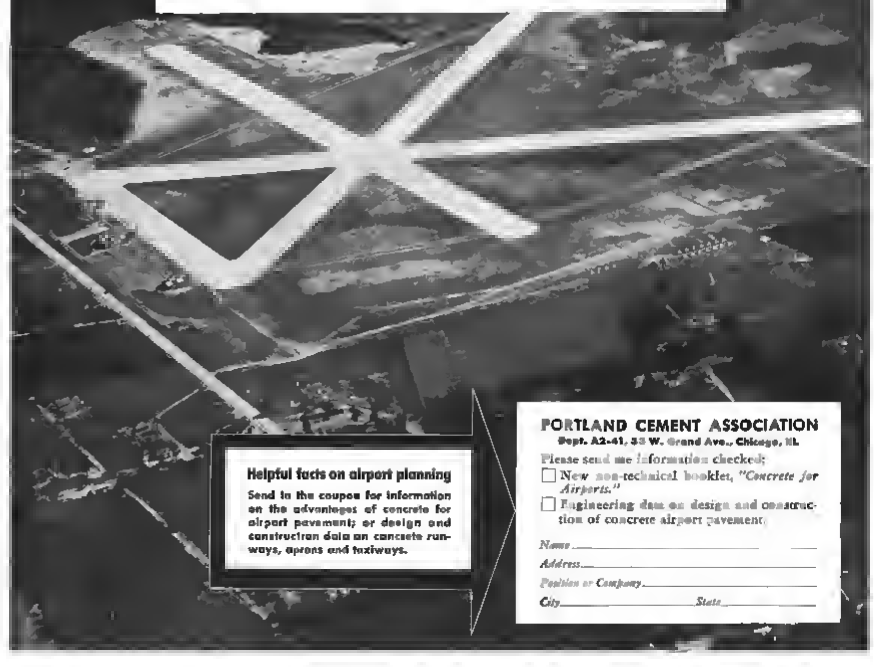

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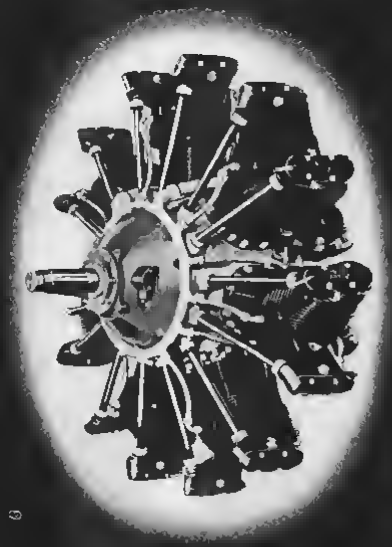

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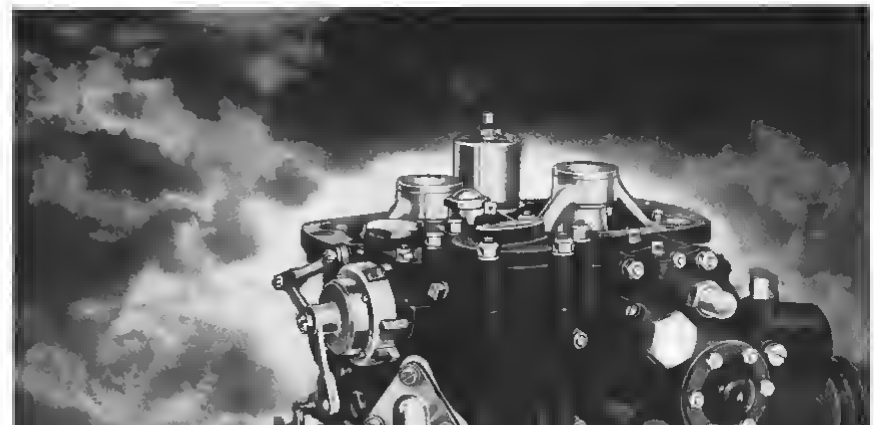

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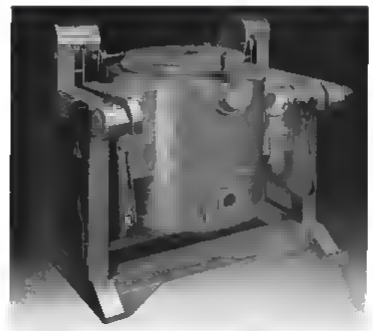

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Melting Costs . . .
POWER DIVE

MOTORIZED FURNACES
for melting
BRASS—BRONZE—ALUMINUM—MAGNESIUM
and other NON-FERROUS ALLOYS

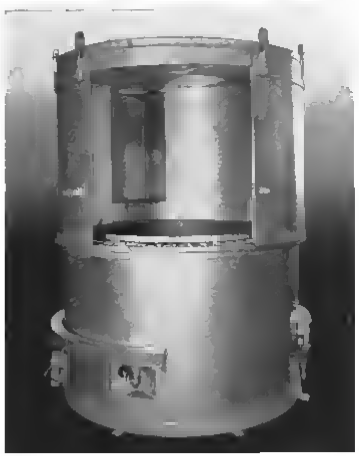
The Fisher Motorized Nose Pouring Melting furnace is the most recent addition to the complete line of Fisher Furnaces. It can be supplied for any crucible size available and for iron or steel pots. Largest capacity made to date—2000 lbs. of magnesium metal.

The Fisher Nose Pouring Furnace features a constant pouring arc; a positive and instantly controlled pouring rate reduced overall furnace height; elimination of arduous labor during pouring operation.

The complete Fisher line includes all standard designs of both stationary and tilting furnaces. The Fisher M. N. P. furnace is fully described in Bulletin No. 57. Write for your copy.

IRON POT FURNACES
FOR MELTING—ALLOYING—HOLDING OIL CASTING METAL

Melting costs as low as 11¢ per ton are accredited the Fisher Iron Pot Melting Furnaces. A few of the design features making this low cost possible are: proper combustion of gases before leaving combustion chamber; correctly proportioned flue area to size of furnace; elimination of dead pockets of inert gases; granting freedom of circulation and uniform distribution of hot gases to entire pot surface; tangential firing burners; high grade insulated refractory lining and rugged construction. Available in gas or oil fired units with capacities from 100 to 10,000 pounds in zinc. Write for Bulletin No. 101.



Melting time is reduced and new standards of uniformity are established, with a material saving in melting costs, by the individuality of furnace design and construction resulting from Fisher's thirty-five years of experience in foundry equipment manufacture. Fisher engineers will counsel to co-ordinate equipment to plant conditions for maximum efficiency. Consult Fisher engineers on your melting problems.

FISHER FURNACE COMPANY
1748 N. KOLMAR AVE. • • • CHICAGO, ILLINOIS

Rongir Wear Clothing Co
Scully Bros Inc.
Sutliff Parachute & Equipment Co
Zielinski Co Michael A.

Compasses Navigation—see Instruments

Concentrators Radio

Aeronautical Radio Co
Airguide Inc
Air Radio & Instrument Co
Aircraft Accessories Corp
Airplane & Marine Direction Finder Corp
Amarlaco Aircraft Radio Div of Scullin Aero Industries Inc
Bendix Aviation Ltd
Doolittle Radio Inc
Fairchild Aviation Corp
Fisher Research Laboratory
Fraser & Co
Gray Radio Co
Harvey Radio Laboratories Inc
Lear Avia Inc
Mallory & Co P R
Micamold Radio Corp
Lanzerotti Radio Corp
RCA Mfg Co
Radio Navigational Instrument Corp
Siebenthaler Div Aircraft Accessories Corp.
Stratosphere Inc
Washington Institute of Technology Inc
Westinghouse Electric & Mfg. Co

Compounds Cleaning

American Chemical Paint Co
Baltimore Paint & Color Works Inc
Bendix Products Div Bendix Aviation Corp.
Dee Bee Chemical Co.
Chicago Thrift Co
Circo Products Co
Detroit Rex Products Co
du Pont de Nemours & Co E I
Flick-Reedman Wilco Inc
Fischer & Porter-Sarco Inc
Ford Sales Co J R
Garlock Co R. A.
Hunnicutt Valve Mfg Co
Houghton & Co E. F
Johnson & Son Inc S. C
Kaiser Metals Inc
Lowe Bros Co
Magnus Chemical Co
Miller Mfg. Co
Oakite Products Inc.
Pacific Metals Co
Permatex Co
Petroleum Sanitette Corp
Phoenix Oil Co
Quigley Co
Radiator Specialty Co
Sewall Paint & Varnish Co
Sugar Beet Products
Turco Products Inc

Compressors Air

American Engineering Co
Blohm Mfg Co
Brunner Mfg Co
Chicago Pneumatic Tool Co
General Construction Corp Mfg. Div
Goulds Pumps Inc
Ingersoll-Rand Co
Marquette Metal Products Co
Mesabi-la Metal Corp.
Nash Engineering Co
Ronco Lunge Div
Sauer-Bell Mfg. Co.
Sullivan Machinery Co.
United States Air Compressor Co

Connectors Electrical—see Plugs Electrical Connecting

Controls

Adel Precision Products Corp
Aeronautical Mfg. Corp
Aircraft Accessories Corp
Aircraft Development Co.
Aircraft Engineering Products Inc
Aircraft Steel & Supply Co
Airscrew Mfg. Co
American Hard Rubber Co
American LaFrance-Foamite Corp
Arens Controls Inc
Breeze Corporations
Guardian Electric Mfg. Co
Harlow Aircraft Co
Kelley Sachtleben & Supply Co
Kenyon Instrument Co
Langley Instrument & Machine Co
Liquidometer Corp
Munro Eastwood & Co
Pantin Scientific Co
Pollak Mfg Co
Shakespeare Products Co Siebenthaler Div Aircraft Accessories Corp
Simmonds Accessories Inc
Stacey Products Inc
Tapleblow Mfg Co. C J
Vel Autogyro Corp
Tennessee Aircraft Institute Inc
Tinnerman Engineering Co
Vargo Mfg Co
Westinghouse Co

Controls and Assemblies, Hydraulic

Arrotorque Co
Adel Precision Products Corp
Aeronautical Mfg Corp.
Aeroquip Corp
Aircraft Accessories Corp
Aircraft Engineering Products Inc
Aircraft Steel & Supply Co
Airscrew Mfg Co.
Are Equipment Corp
Bakewell Mfg Co
Bendix Aviation Ltd.
Dowty Equipment Corp
Fleetwings Inc
Harlow Aircraft Co
Houde Engineering Corp.
Interstate Aircraft & Engrg Corp
Logansport Machine Inc
Marquette Metal Products Co
Pacific Aviation Inc.
Pump Engrg. Service Corp
Republic Aircraft Products Div of Aviation Corp
Romec Pump Co
Simmonds Accessories Inc
Smith Henry Corp
Sperry Products Inc
Textron Products Co
Uebelhoer Brothers, Inc
United Aircraft Products Inc
Ward Mechanical Laboratory
Vickers Inc.
Wagner Co Paul G
Warner Aircraft Corp

Coolers, Oil—see Radiators

Cord Shock—see Struts and Cord Shock

Covers (Engine Deckit Windshield)

Celluloid Corp
Cluff Fabric Products Inc
Comstock & Co
Radon Aircraft Co
Heath Co
Johnson Parachute & Equipment Co
Mallin Bros & Co
Monsanto Chemical Co Merrimac Div
Parachute Corp. of America
Rae Aeronautical Co
Sardlow Aeroplastics Corp
Sutliff Parachute & Equipment Co
Wilbur & Son

Cowls

Aero Trades Co
Aircraft Development Co.
All American Aircraft Products Inc.
B H Aircraft Co
Bannon Mfg. Co
Buhl Stamping Co
Cecil Bros C W
Engel Aircraft Specialties
Fletcher Aviation Corp
Harlow Aircraft Co
Hill Aircraft Streamlinges Co
Mc Donnell Aircraft Corp
Molaro Metal Mfg. Co
Pollak Mfg Co
Robertson Aircraft Corp
Ryan Aeronautical Co.
St. Louis Aircraft Corp.
Skyjack Aircraft Corp
Talabee Mfg. Corp
Tennessee Aircraft Institute Inc.
Timm Aircraft Corp.
Vega Airplane Co

Cushions Seat—see Seats

Dampers Vibration

Aircraft Accessories Corp
Connecticut Hard Rubber Co.
Houde Engineering Corp.
Lord Mfg Co
Sheffield Gage Corp.
Virginia Rubatex Corp

De Icers

Aerotorque Co
Adel Precision Products Corp
Aeronautical Mfg Corp.
Aircraft Engineering Products Inc.
Are Equipment Co
Bannon Mfg Co
Chicago Thrift Co
Eclipse Aviation Div Bendix Aviation Corp.
Final Development Corp
Goodrich Co B F
Kollsman Instrument Div Square D Co
Pump Engrg. Service Co
Quality Electric Co.
Siebenthaler Div Aircraft Accessories Corp
Standard Aircraft Equipment Co

Dynamotors

Air Radio & Instrument Co.
Dague Electric Co
Cutler Motor Co
Continental Electric Co
Diehl Inc.
Electric Specialty Co
Jack & Heintz Inc
Lear Avia Inc
Pioneer Gen-E-Motor Corp
Quality Electric Co
Standard Aircraft Equipment Co

Equipment Aircraft Lighting—see also Plugs Electrical Connecting—also Switches

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Air Radio & Instrument Co
American Aircraft Radio Div of Scullin Aero Industries Inc
American Phenolic Corp.
Anaconda Wire & Cable Co.
Boston Insulated Wire & Cable Co.
Cannon Electric Development Co
Connecticut Telephone & Electric Corp
Corcoran Brown Lamp Div Electric Auto Lite Co
Douglas Mfg Co H A
Drake Manufacturing Co
Grimes Mfg. Co
Harlow Aircraft Co
Jones Howard B
Kahnert Instrument Co.
Kenyon Transformer Co.
Kollsman Instrument Div Square D Co
Lear Avia Inc
Lights Inc.
Littelfuse Inc
Mallory & Co P R
Photo Record Equipment Co
Pyle-National Co
Roehlinger Sons Co John A.
S & M Lamp Co.
Scintilla Magneto Div Bendix Aviation Corp
Simplex Wire & Cable Co
Sparks Withington Co
Standard Aircraft Equipment Co
Standard Aircraft Products Inc
Westinghouse Electric & Mfg. Co
United States Radium Corp.

Equipment Airport—see also Equipment, Airport Lighting also Tractors and Snow Removal Equipment

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Automatic Temperature Control Co
Bacon Valentine Mfg Co
Bador Electric Co
Barrett Co
Beaton & Carbis Mfg Co
Brass Shops Edward A
Bryant Heater Co
Butler Mfg Co
Card Sons C W
Columbian Steel Tank Co
Couch Co S H
Cuno Laboratories Inc
Federal Aircraft Works
General Fire Truck Corp
Goulds Pumps Inc
Guth Co Edwin F
Ideal Power Lawn Mower Co
Independent Iron Works
La Mar Indicating Fuse Corp
Micro-Westco Inc
Speedilo Mfg Co
Stanley Electric Co
Siebenthaler Div Aircraft Accessories Corp.
Simmonds Accessories Inc.
Sauer Hammond Equipment Co
Sparks Withington Co
Sterling Siren Fire Alarm Co
Stewart, M. C.
Taft-Peirce Mfg Co
Telautograph Corp
Twin City Tool Co
White Co David
Whiting Corp.

Equipment Airport Lighting

Airplane Electric Co
Arrow Hart & Hegeman Electric Co
Automatic Electric Co
Bardco Mfg. Sales Co
Bogue Electric Co
Boston Insulated Wire & Cable Co
Bryant Electric Co.
Chevrolet Mfg Co
Cramer Co R. W
Curtis Lighting Inc
Deutschmann Corp Tobe
Dunn Inc Strathmore
Electric Auto Lite Co
Electric Service Supplies Co
Electric Specialty Co
Fibre Conduit Co
Fostoria Pressed Steel Corp
Gem City Steel Metal & Mfg Co.
General Electric Co
Guardian Electric Mfg. Co
Hardwick Hindle Inc
Hart Mfg Co
Helenbaum Co
Jones Howard B
Kenyon Transformer Co.
Lear Avia Inc
Lights Inc.
Mallory & Co P R
North American Electric Lamp Co
Stokes Co
Thomas & Betts Co
Tietjenson Engrg Co
Triumph Explosives Inc
Uehling Transformer Corp.
Ward Leonard Electric Co
Westinghouse Electric & Mfg. Co
Wurzler Reflector Co

Equipment First Aid—see First Aid Kits and Supplies

Equipment and Supplies Drafting Room

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Brunting Co Charles
Dietzen Co Eugene
Eagle Pencil Co
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Keuffel & Esser Co
Kohlmeyer Sanell Co
Smith Products Div General Aniline & Film Corp
Pease Co C F
Post Co. Frederick

Equipment Shoe

Aero Tool Co
Air Reduction Sales Co
Air Transport Equipment Inc
Aircraft Accessories Corp
Alberican & Co
Allan Electric & Equipment Co
Aluminum Ladder Co
American Chain & Cable Co.
American Instrument Co
Atlas Press Co
Baird Machine Co
Baker Industrial Truck Div of Baker Raulang Co
Balder Electric Co
Bardons & Oliver Inc
Biddle Co James G
Binks Mfg. Co.
Black & Decker Mfg. Co
Blackhawk Mfg Co
Brown Instrument Co.
Brunner Mfg. Co
Buckeye Portable Tool Co
Buffalo Forge Co.
Bullard Co
Burton-Rogers Co
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Cedar Rapids Engineering Co. of Delaware
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Chicago Rawhide Mfg. Co
Cincinnati Milling Machine & Cincinnati Grinders, Inc.
Continental Machines Inc.
Cosa Laboratories Inc
Cullman Wheel Co.
Curtis Pneumatic Machinery Co
DeJur Amsco Corp
Despatch Oven Co
Detroit Gas Products Co
Detroit Surfacing Machine Co
DeVilbiss Co
Ducommun Metals & Supply Co
Dumore Co
Barometal Tool Co
Eastern Engineering Co
Eclipse Air Brush Co
Eclipse Fuel Engrg. Co
Electric Furnace Co
Engineering & Research Corp
Engis Equipment Co
Ex-Cell-O Corp
Fairbanks Co
Fairbanks Morse & Co
Fansteel Metallurgical Corp
Farnham Mfg. Co
Farrel Birmingham Co
Fay & Eagan Co J A
Federal Aircraft Works
Fellows Gear Shaper Co.
Ferracute Machine Co
Fisher Furnace Co
Flexible Shaft Co of New York
Florian Mfg Co
Fostoria Pressed Steel Corp
Frank Gallmeyer Mfg Co.
General Electric Co.
General Scientific Equipment Co
Geometric Tool Co
Gisholt Machine Co
Glaser-Roberts Co
Gladell Pratt Co
Greenfield Tap & Die Corp
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Harris Calorific Co
Hartford Special Machinery Co
Haskins Co. & G
Heald Machine Co
Heinemann Circuit Breaker Co
Handey Machine Co
Hanson Machine & Tool Works Emil
Hartland Corp
Hobart Bros. Co
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Hydraulic Press Manufacturing Co
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Illinois Testing Laboratories Inc.
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Ingersoll Road Co
International Engrg. Works, Inc.
Jacobs Mfg Co.
Johnson Co Lloyd S
Johnson Machine Co Carlyle
Kaplan Solder Co
Kirk & Blum Mfg Co
Kux Mfg Co Inc.
Koch Sons Inc. George
Langis Tool Co
La Blond Machine Tool Co R. K
Lampco Products Inc.
Lincoln Electric Co.
Linde Air Products Co
Lisle Corp.
Lodge & Shipley Machine Tool Co
Lovejoy Tool Co
Lufkin Rule Co
Lyon Metal Products Inc.
Magnaflux Corp
Manley Mfg Div American Chain & Cable Co.
Martin-Decker Corp.
Metal & Thermit Corp.
Micromatic Hone Corp
Milburn Co. Alexander
Milton Falls Co
Minneer Mfg. Co
Morris Engineering Co
National Aircraft Equipment Co.
National Automatic Tool Co
National Broach & Machine Co.
National Machinery Co
Niagara Machine Tool Co
Nicholson File Co
Northwest Air Service Inc.
O K Tool Co
Olsen Testing Machine Co Tinius
Pesacha Airbrush Co

Vega Announces the Vega 35

AN ALL-METAL PRIMARY-SECONDARY TRAINER

THE NEW VEGA is a low-wing, training airplane, designed specifically to meet the rigid C. P. T. P. requirements for both primary and secondary training. At the same time it conforms to all primary military training specifications. It is the first and only airplane to meet *all* these needs.

The Vega 35 offers training schools excellent serviceability and features never before found in *one* airplane. Students learn the *right* form—right from the start of their training. Excellent visibility within line engines...perfected stall control characteristics... wide tread landing gear with individually controlled brakes...and wing flaps for low landing speed. Such features simplify the job of the instructor and inspire confidence in the student.

Stouter Wings for Fledglings

VEGA

VEGA AIRPLANE COMPANY
Burbank, California

Peck Stow & Wilcox Co
Porcupine Co
Precise Tool & Mfg. Co.
Progressive Welder Co
Prosser & Son, Thomas
Reed Prentice Corp
Rivett Lathe & Grinder, Inc.
RMA Standards Institute
Rocky Mountain Steel Co
Rucker Mfg. Co
Saylor Beall Mfg. Co.
Scherr Co., George (Importer)
Schrader's Son, A., Div. Scovill Mfg. Co
Seifert Pneumatic Tool Co.
Siebenthaler Div. Aircraft Accessories Corp
Simmonds Aerocessories Inc.
Simmons Saw & Steel Co.
Sullivan, Inc.
Smith Welding Equipment Corp
Snap On Tools Corp
South Bend Lathe Works
Spencer Thermostat Co
Stanley Works
Standard Pressed Steel Co
Starrett Co., L. S.
Sundstrand Machine Tool Co
Sunnen Products Co
Taft-Peirce Mfg. Co
Tannewitz Works
Tubular Products Inc.
Templeton, Kenly & Co
Thompson Grinder Co.
Thompson & Son Co., Henry G
Tietzmann Engineering Co
Toledo Scale Co.
Tolhurst Centrifugal Div. American Machine & Metals, Inc.
Tomkins-Johnson Co
Tripplett Electrical Instrument Co
Tucker, Inc., W. W. & C. F
Unilay Accessories Corp
Union Carbide Co.
Unist Mfg. Co
Unitu Special Machine Co
United States Electrical Tool Co
Van Dorn Electric Tool Co.
Van Norman Machine Tool Co.
Vendel Rool Inc.
Vinco Corp.
Vlchek Tool Co.
Walker Mfg Co
Weidenhoff Inc., Jos
Westinghouse Electric & Mfg. Co
Wheelco Instruments Co
White Dental Mfg Co., S S
Whiting Corp
Wiedemann Machine Co
Wilkening Mfg Co
Williams & Co., J. H
Wilson Co., H A
Yale & Towne Mfg. Co
Zelso Inc. Carl

Extinguishers, Fire

American LaFrance Foamite Corp
Badger Fire Extinguisher Co
Carbon Corp
C-O-Two Fire Equipment Co
Dugas Engineering Corp
Fog Nozzle Co.
Fyr Fyter Co.
General Fire Truck Corp.
Kidde & Co., Walter
Pelger, McCaw & Co
Pyrene Mfg. Co
Pyrene Mfg. Co
Rockwood Sprinkler Co
Snyder & Son, M. L.
Stempel Fire Extinguisher Mfg. Co
Wil-X Mfg. Corp

Extrusions, Metal

Ampco Metal Inc
Baillie Metal Products Co
Carpenter Mfg. Co., E. W
Chase Brass & Copper Co
Cosco Mfg. Co
Dow Chemical Co
Magnesium Products Inc
Nicrotumbo Co
Reynolds Metals Co
Steel Forming Corp

Fabrics, Aircraft

Ale Associates Inc.
Aircraft Steel & Supply Co
Anderson Flax Fiber Co
Blanchard Bro. & Lane
Landers Corp.
Melton Bros. & Co
Pantasote Co
Pelger, McCaw & Co
Schwarzenbach Huber Co
Seaman Paper Co
Sunbrook Mills
Thorp & Co., J. H
Uniform Hemd Lace Co
Wangenna Quinebaug Mills Inc
Wellington Sears Co

Fabrics, Upholstery

Anderson Flax Fiber Co.
Bachelay Weil Co
Bibb Mfg Co.
Blanchard Bro & Lane
Bloomfield & Co., Sidney
Bridgeport Fabrics Inc
Bristol Brook Co
Chase & Co., L. C
Chaff Fabric Products Inc
Collins & Aikman Corp

Comstock & Co
Conmount Leather Co
du Pont de Nemours & Co, E. I. (Fabrikoid Div.)
Eagle-Ottawa Leather Co
Dillette & Co., John W
Goodrich Co., B. F
Johnson & Funkhouser Inc
Kenwood Mills
Lackawanna Leather Co
Laidlaw Co
Landers Corp.
Massachusetts Mohair Plush Co
Mellus Bros & Co.
Pantasote Co.
Payne & Co
Pelger, McCaw & Co
Rudel Leather Mfg. Co.
Schlegel Mfg. Co.
Schumacher & Co., F
Schwarzenbach Huber Co
Shelton Looms
Tallmadge Co.
Thorp & Co., J. H
United States Rubber Co.

Fasteners
see also Screws, Nuts and Bolts

American Screw Co.
Anderson Flax Fiber Co.
Anti-Corrosive Metal Products Co.
Parflow Fastener Co.
Elco Mfg. Corp
Hobb & Drum Inc
Hoskin Screw Corp.
Durant Thimbleel Corp
Dill Mfg. Co
Dunn Fastener Co
Eaton Mfg. Co. Reliance Spring Washer Div
Elastic Stop Nut Corp
General Aircraft Supply Corp
Goodrich Co., B. F
Hartford Machine Screw Co
Ideal Clamp Mfg Co.
Jadean Motor Products Co
Kenyon Instrument Co
Mellus Bros & Co
Milford Rivet & Machine Co
Palnut Co.
Parker Kalon Corp.
Pollak Mfg Co
Scovill Mfg Co
Simkrproof Lock Washer Co
Simmonds Aerocessories Inc
Strecter Amri Co
Thompson Products Inc
Timerman Products Inc
United-Carr Fastener Corp.
Weldes Kab-I Nour Inc
Whitek Manufacturing Co
Wrought Washer Mfg Co

Fences

American Chain & Cable Co
American Steel & Wire Co
Anchor Post Fence Co.
Cyclone Fence Co
Highbridge-Intermount Co
Page Fence Assn.
Page Steel & Wire Div. American Chain & Cable Co
Pittsburgh Steel Co.
Republic Steel Corp
Stewart Iron Works Co.
Wickwire Spencer Steel Co

Fillers and Strainers

AC Spark Plug Div. General Motors Corp
Aloi Precision Products Corp
Aeronautical Mfg. Corp
Air-Maze Corp.
Aircraft Engineering Products Inc
Bigue Electric Co
Dean Engineering Corp
Dover Stamping & Mfg. Co.
Dowty Equipment Corp.
Kellogg Switchboard & Supply Co.
Kruisel Co
Newark Wire Cloth Co
Parmlee Products Inc.
Rolock, Inc.
Tietzmann Engineering Co.
United Aircraft Products Inc
United Transformer Corp

Finishes

Acme White Lead & Color Works
Aircraft Steel & Supply Co
American Cellulose Co
American Chemical Paint Co.
Arco Co
Ault & Wiborg Corp
Avondale Chemical Co
Bakelite Corp
Baltimore Paint & Color Works, Inc
Berrett Varnish Co
Berry Bros
Brooklyn Varnish Mfg Co
Celluloid Corp
Chicago Thrift Co
Cirria & Sons, Charles
Colonial Alloys Co
Cook Paint & Varnish Co
Dibble Color Co
du Pont de Nemours & Co, E. I. (Fabrikoid & Pyralin Dept.)
Egyptian Lacquer Mfg. Co
Fillrr & Co., W. P.
General Aircraft Supply Corp
General Paint Corp
Glidden Co.

Goodrich Co., B. F
Hilo Varnish Corp
James Dubroff Co
Kay & Ess Co
Lowe Bros Co.
Marbal Co.
Monsanto Chemical Co. Merrimac Div
Murphy Varnish Co
Perry Austen Mfg. Co
Pyrate Aircraft Products Co.
Pierce & Stevens Inc.
Pittsburgh Plate Glass Co
Pratt & Lambert, Inc
Pyrasylia Products Inc
Randolph Finishing Products Co
Sirillic Paint & Varnish Co
Sissell Paint & Varnish Co
Sherwin Williams Co
Skibrsia Co
Socony Paint Products Co.
Surey Engineering Co
Titanine, Inc.
United States Radium Corp
Valentine & Co
Wallen Dove-Hutchison Corp
Wesley Lacquer Co
Wipe-On Corp.
Zapon Div., Atlas Powder Co.

Fire Extinguishers—see Extinguishers, Fire

First Aid Kits and Supplies

Baurr & Black
Bullard Co. E. D
Burroughs Wellcome & Co
Davis Emergency Equipment Co
First Aid Supply Co
General Scientific Equipment Co
Johnson & Johnson
Miss Safety Appliances Co
Seabury Inc.

Fittings, Control

Armonalited Mfg Corp
Arcoplp Corp
Aguayo Aircraft Products Inc.
Aircraft Development Co.
Aircraft Hardware Mfg. Co
Anti Corrosive Metal Products Co.
Arcon Controls Inc
B. H Aircraft Co.
Cosco Mfg. Co.
Dollis Corp
Electrollac Co
Flex-O-Tube Co
Harlow Aircraft Co
Hartford Machine Screw Co
L. M Gear Co
Macwhyte Co
Mason Co., Thomas
McDonnell Aircraft Corp
Parker Appliance Co
Precision Products Inc
Siebenthaler Div. Aircraft Accessories Corp.
Simmonds Aerocessories Inc.
Skylark Aircraft Corp
Springfield Brass Co
Standard Aircraft Products Inc.
Tranck Mfg Co. J J
Voges Mfg Co.

Fittings, Structural

Aguayo Aircraft Products, Inc.
Aircraft Products & Engrg. Corp.
Aircraft Steel & Supply Co.
Bailey Co
Berton Co. L F
B H Aircraft Co.
Dollis Corp
Harlow Aircraft Co
McDonnell Aircraft Corp.
Packton Metal Products Corp
Reynolds Inc Corp
Reynolds Metals Co
Siebenthaler Div. Aircraft Accessories Corp
Simmonds Aerocessories Inc
Skylark Aircraft Corp.
Springfield Brass Co
Standard Aircraft Products Inc.
Steel Forming Corp
Weatherhead Co

Flares

American Armament Corp
Bankes Sons, Inc., M.
Coulon Supply Co
Dollis Corp.
International Flare-Signal Div. Kilgore Mfg. Co
Johnny's Parachute & Equipment Co
New Jersey Fulgent Co
Parachute Corp. of America
Pollak Mfg. Co
Schwarzenbach Huber Co
Standard Aircraft Equipment Co
Triumph Explosives Inc.

Floats and Skis

Air Transport Equipment Inc
B. H Aircraft Co
Brewster Aeronautical Corp.
Hightstrom Metallic Door Co
Ido Aircraft Corp
Fabrin Mfg Co
Federal Aircraft Works
Fleetwings Inc
Gerth Co.
Kirkham Engineering & Mfg Corp
Northill Co
St. Louis Aircraft Corp
United States Plywood Corp
Washington Aircraft & Transport Corp.

Forgings

Alsco Tool Co
Aircraft Steel & Supply Co
Allegheny Forging Co
Aluminum Co of America
Ampco Metal Inc.
Atlas Drop Forge Co
Bethlehem Steel Co
Billings & Spencer Co.
Bridgeport Hardware Mfg. Corp.
Canton Drop Forging & Mfg Co.
Champion Machine & Forging Co
Chase Brass & Copper Co
Cleco Mfg. Co., E. D
Dow Chemical Co
Endicott Forging & Mfg. Co
Farrel Birmingham Co.
Fitzgerald Mfg Co
General Metals Corp.
Gorn Nelson Co
Harrisburg Steel Co
Herbrand Corp
Highbridge Intermount Co
Interstate Drop Forge Co
Jadson Motor Products Co.
Kropp Forge Co
Ladish Drop Forge Co
Lempco Products Inc.
Magnesium Products Inc.
Mondie Forge Co
Moore Drop Forging Co
National Aircraft Equipment Co.
Park Drop Forge Co
Paulsen Tools, Inc.
Revere Copper & Brass Inc.
Redwood Sprinkler Co
Stokes Drop Forging Co.
Shafer Axle Co
Tyrone & Williams Steel Forging Corp
Union Drawn Steel Steel Div. Republic Steel Corp.
Union Switch & Signal Co.
Weatherhead Co.
Western Forge & Tool Works
Williams & Co., J. H
Wyman Gordon Co

Frames, Chair—see Seats

Fuels

Atlantic Refining Co
Cities Service Oil Co
Colonial Beacon Oil Co
Esso Marketers
Ethyl Gasoline Corp
Flake Bros Refining Co.
Fuel Development Corp.
Gulf Oil Corp.
Hamlin Oil & Refining Co., Aviation Dept.
Kendall Refining Co.
Pennzoil Co
Phillips Petroleum Co
Pure Oil Co.
Shell Oil Co
Shell Petroleum Corp
Sinclair Refining Co
Socony-Vacuum Oil Co., Aviation Sales Dept.
Stanavo Specification Board, Inc.
Standard Oil Co. of Calif.
Standard Oil Co. (Indiana)
Standard Oil Co. of Ky
Standard Oil Co. of La.
Standard Oil Co. of N. J
Standard Oil Co. (Ohio)
Standard Oil Co. of Texas
Texas Co.
Tidewater Associated Oil Co
Union Oil Co. of California
Wolverine Empire Refining Co

Fuses, Electric—see Equipment, Aircraft Lighting also Equipment, Airport Lighting

Gages

see also Instruments

Air Radio & Instrument Co.
Airco Tool Co.
American Instrument Co.
Bath & Co., John
Boston Auto Gage Co
Connecticut Tool & Engrg. Co.
Dayton Dyne Inc
Electric Auto-Lite Co
Federal Products Corp
Flarlch Mfg. Co
General Electric Co
Kenyon Instrument Co.
Kollsman Instrument Div. Square D Co
Liquidometer Corp
Manning, Maxwell & Moore, Inc.
Menasco Engineering Co
Production Tool & Die Co.
Rochester Mfg. Co.
Sheffield Gage Corp.
Simmonds Aerocessories, Inc.
Standard Aircraft Equipment Co
Taft-Peirce Mfg. Co.
Tagliabue Mfg. Co., C. J.
Troy Tool & Gage Co
Twin City Tool Co
United Precision Products Co
United States Gauge Co
Vinco Corp.

Galvanizing, Plating etc.

Anchor Post Fence Co
Buhl Stamping Co
Chicago Thrift Co.
Commonwealth Industries
Dover Stamping & Mfg Co.
National Postal Meter Co
Newark Nickel-Chromium Plating Co
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* Illustrated above is a typical Simmonds-Corsey application to "cushioned" power. Note rigid conduit at actuating end, flexible conduit terminals at operating end

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An illustrated bulletin descriptive of Simmonds-Corsey Controls will be sent without obligation if requested on your business letterhead.

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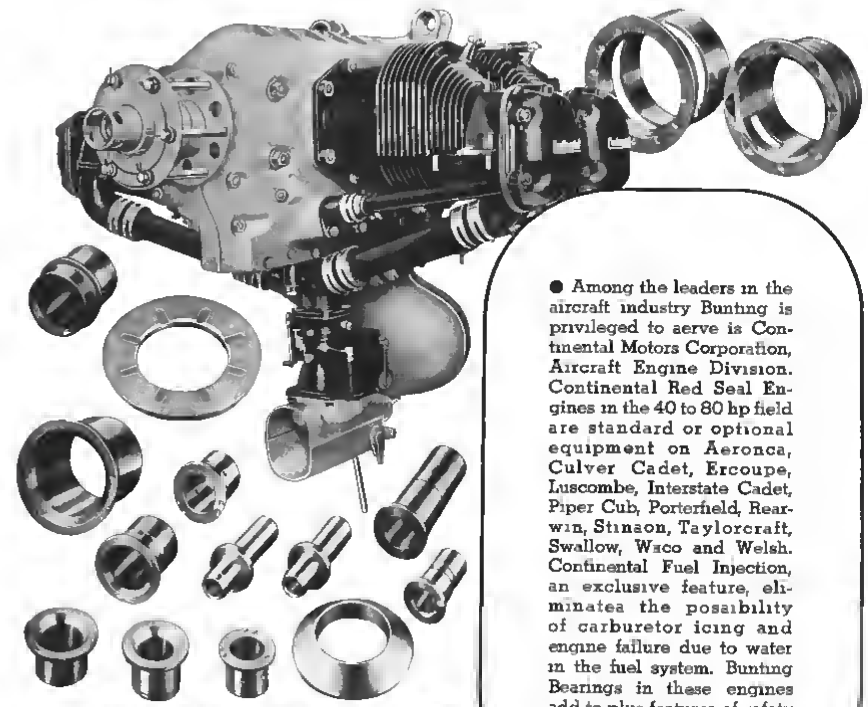

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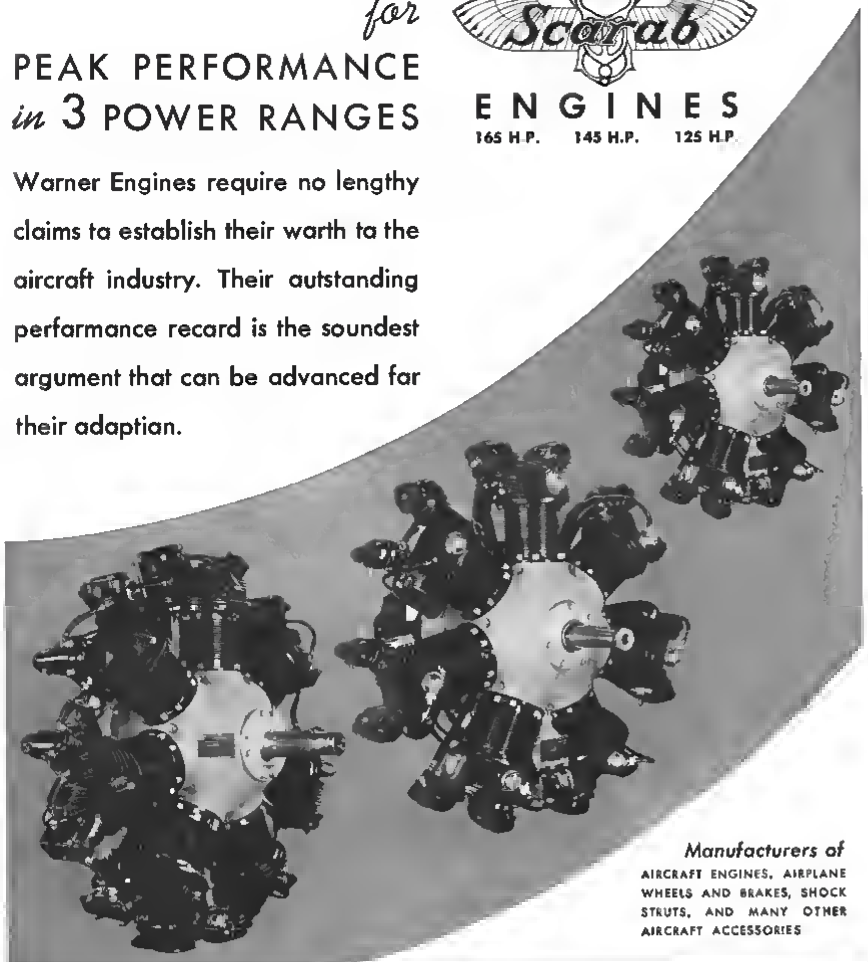

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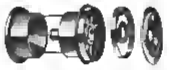

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Copyright, 1941, The Firestone Tire & Rubber Co.

Siebenthaler Div Aircraft Accessories Corp
Walworth Co.
Weatherhead Co

Plywood—see Wood and Plywood also Parts, Fabricated Plywood

Primers

Ansco Whitin Lead & Color Works
Adel Precision Products Corp
Aeronautical Mfg Corp
Aquaseal Chemical Paint Co
Arco Co
Baltimore Paint & Color Works Inc.
Barrett Varnish Co
Berry Bros.
Brooklyn Varnish Mfg Co.
Dibble Color Co
du Pont de Nemours & Co. E. I
Egyptian Lacquer Mfg Co
Fuller & Co. W P
Hill Varnish Corp
Jones Dabney Co
Kay & Ess Co
Klein Paint & Varnish Works
Lankenheimer Co
Monsanto Chemical Co. Merrimac Div
Parker Appliance Co
Pyroxylin Products Inc.
Sewall Paint & Varnish Co.
Sindoprime Products Co
Standard Aircraft Equipment Co.
Valentine & Co
Worley Lacquer Co

Propellers and Parts

Aeroproducts Div General Motors Corp
Air Transport Equipment Inc
Aircraft Engineering Products Inc
Aircraft Hard & Supply Co
Aro Equipment Corp
Bardley Grove Aircraft Corp
California Propeller Corp
Curtiss-Wright Corp Curtiss Propeller Div
Engineering and Research Corp
Hartzell Propeller Corp
Hollin Mfg. Co.
Hollow Propeller Co
Freedman-Hamilton Engrg. Corp.
Gardner Propeller Co
General Aircraft Supply Corp
Hamilton Standard Propellers Div United Aircraft Corp.
Hartzell Propeller Fan Co Div of Hartzell Industries Inc
Lermon Propeller Co
Lycoming Div Aviation Mfg. Corp.
Marquette Metal Products Co.
Marshall-Hollin Propeller Co
Maynard Pd Cesare Propeller Corp
McCauley Metal Propeller Co
Pilot Propellers, Inc.
Pittsburgh Screw & Bolt Corp
Precision Products Inc
Republic Aircraft Products Div of Aviation Corp.
Sensenich Brothers
Siebenthaler Div Aircraft Accessories Corp
South Bend Air Products Inc.
Stoon Propeller Co.
Story Hanley Co
Taft Peirce Mfg Co
Taylor Machine Co.
Thompson Products Inc
Tiefenthal Engineering Co
Universal Aircraft Co
Worcester Pressed Steel Co

Pulleys

Barnard Aviation Equipment Co
Cardwell Metal Works Inc
Cooke Sheet Corp
Formica Insulation Co
Mason Co. Thomas
Molded Insulation Co.
Precision Products Inc
Sprout Waldron & Co.

Pumps Fuel

see also Systems Aircraft Fuel

Aircraft Steel & Supply Co
Aro Equipment Corp
Blackburn Pumps Co
Bowser & Co. S F
Camiller Hill Corp
Chandler Engine Corp.
Final Impeller Corp
Gruzberg Equipment Inc
Jones Motrich Sales Co
Kruisel Co
Mechanics Metal Corp.
Pump Engrg. Service Corp.
Romec Pump Co
Rupp Corp George D
Standard Aircraft Equipment Co
Tait Peirce Mfg. Co.
Thompson Products Inc

Radiators

Allesreich Mfg. Co
G & O Mfg Co
Harrison Radiator Div General Motors Corp
McCord Radiator & Mfg. Co.
McQuay Inc
Mont Tanney Radiator Co
Standard Aircraft Products Inc
United Aircraft Products Inc.
Young Radiator Co

Radios Aircraft

Aeronautical Radio Co.

Air Radio & Instrument Co
Airadio Co
Aircraft Accessories Corp
Aircraft Radio Corp.
Airguide, Inc.
Airplane & Marine Direction Finder Corp
Andrew Laboratories, E. F
American Aircraft Radio Div of Scarlet Aero Industries Inc.
Bendix Aviation Ltd.
Bendix Radio Corp
Collins Radio Co
Doolittle Radio Inc.
Douglas Mfg Co. H A
Electronic Specialty Co
Fairchild Aviation Corp
Fisher Research Laboratory
Fraun & Co
General Electric Co
General Radio Co.
Gray Radio Co.
Harvey Radio Laboratories Inc
Harvey Wells Communications Inc.
Helmi & Kaufman Ltd.
International Telephone Development Co
J V W Corp
Lear Developments Inc.
National Co
Panoramic Radio Corp
Radio Frequency Laboratories Inc
Radio Navigational Instrument Corp.
Radio Receptor Co
Radiomarine Corp of America
RCA Mfg. Co.
Siebenthaler Div Aircraft Accessories Corp
Sparks-Withington Co
Stantosearch Inc.
Taylor Airphone Products Inc
Telegio Products Inc
Transmitter Equipment Mfg. Co
Washington Institute of Technology Inc
Western Electric Co Specialty Products Div
Westinghouse Electric & Mfg Co

Rubber—see Spares and Rubs

Rings, Collector

Aircraft Development Co
Aluminum Tube Bending Co.
B H Aircraft Co
Brenco Mfg. Co.
Dahl Stamping Co
Gay Engrg. Corp. of California
Hollow Aircraft Co
Kay Products Co
Koch Bros Inc. George
Lollak Mfg Co
Ryan Aeronautical Co
St Louis Aircraft Corp.
Solno Aircraft Co
Timm Aircraft Corp

Rings, Piston—see Pistons and Rings

Rivets

Chase Brass & Copper Co
Dill Mfg Co
Ensco Asbestos Co
Lamson & Sessions Co
Mid-Stolin Mfg Co
National Screw & Mfg. Co.
Nicralumin Co
Pacific Metals Co.
Republic Steel Corp
Townsend Co
United-Carr Fastener Corp

Rods, Tie

Am Hardware Mfg Corp
Aircraft Steel & Supply Co
American Cable & Cable Co
American Steel & Wire Co.
Bunce Volcanium Mfg. Co.
Bullis Metal Products Co.
Breese Corporations
Harbison Stewart Co
Macwhyte Co
National Screw & Mfg. Co.
Streeter Amet Co
Thompson Products, Inc.
Worcester Pressed Steel Co

Rope, Wire—see Wire and Cable, Structural

Rubber

Acadia Synthetic Products Div Western Felt Works
Adel Precision Products Corp.
American Hard Rubber Co
American Rubber Mfg. Co
Connecticut Hard Rubber Co.
Continental Rubber Works
du Pont de Nemours & Co, E I
Firestone Tire & Rubber Co
Garlock Packing Co.
General Tire & Rubber Co
Goodall Rubber Co
Goodrich Co B F
Goodyear Tire & Rubber Co.
Hirshfield Rubber Co
Manhattan Rubber Mfg Div of Raybestos Manhattan
Miller Rubber Co
Republic Rubber Div Lee Rubber & Tire Corp.
Rubberlite Rubber Co
Standard Rubber Co
Textile Rubber Corp
United States Rubber Co
Virginia Rubatex Corp.

Screws—see Fasteners

Screws, Nuts and Bolts

Air Transport Equipment Inc
Aircraft Engineering Products Inc.
Aircraft Screw Products Co
Aircraft Steel & Supply Co
Aircraft Tools Inc.
American Screw Products
Apex Tool Co
Beaia Aircraft Nut Co
Bristol Co. Mill Supplies Div
Chase Brass & Copper Co
Continental Screw Co
Corbin Screw Corp
Elastic Stop Nut Corp.
Hartford Machine Screw Co
Hills-Keense Screw Corp
Illinois Tool Works
Lamson & Sessions Co
National Screw & Mfg. Co
Pulsat Co
Parker Kalon Corp
Powell Mfg Co
Phillips Screw
Pollak Mfg. Co
Republic Steel Corp
Timerman Products Inc
United Carr Fastener Corp
United Screw & Bolt Corp
Wagner Co. Paul G
Western Aeronautical Supply Mfg. Co.

Seals

Aircraft Development Co
Aircraft Products & Engrg. Corp.
American Tube Bending Co
Aluminum Flex Fiber Co.
Arcasite Aeronautical Corp
Cliff Fabric Products Inc.
Firestone Tire & Rubber Co.
Goodrich Co B. F
Hartzell Aircraft Co
Hayward Wakefield Co.
Kay Products Co.
VinAlum Corp. Warren
Robertson Aircraft Corp.
Rosen Aeronautical Co
Salem Berines Co.
Tennessee Aircraft Institute, Inc.
Tigen Aircraft Corp
United States Rubber Co
Young Spring & Wire Corp L A.

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Air Shields Inc
Aluminum Goods Mfg Co
American Aircraft Radio Div of Scarlet Aero Industries Inc
American Cabin Div American Chain & Cable Co
American Phenolic Corp.
Aquaseal Transformer Co
Belden Mfg. Co
Bendix Aviation Ltd
Bogue Electric Co
Boston Insulated Wire & Cable Co
Brenco Corporations
Cinch Mfg Corp
Collins Radio Co
Deutschmann Corp Tube
Doolittle Radio Inc
Drake Manufacturing Co.
Eitel McCullough Inc
Electric Auto-Lite Co.
General Cabin Corp.
General Radio Co
General Tire & Rubber Co
Goal Co. Fred
Harvey Radio Laboratories Inc.
Kellogg Switchboard & Supply Co
Kenyon Transformer Co.
Lorentzen Inc H K
Molded Insulation Co.
Mallory & Co. P R.
Mason Co. Thomas
National Co
Ohmite Mfg Co.
Packard Electric Div General Motors Corp
Radio Navigational Instrument Corp
Rowan Cord & Wire Co
Scintilla Magneto Div Bendix Aviation Corp.
Selectro Mfg. Corp.
Shure Brothers
Siebenthaler Div Aircraft Accessories Corp
Stanfield Aircraft Equipment Co.
Stantosearch Inc
Taylor Airphone Products Inc
Telegio Products Inc.
Tinnerman Products Inc.
Timflex Metal Hose Co
United Transformer Corp
Universal Microphone Co

Sights Gun—see Armament and Equipment

Sirens—see Equipment Airport

Solids—see Whistle and Sirens, Tell

Skins—see Plastic and Skin

Spark Plugs

AC Spark Plug Div General Motors Corp.
Aero Sound Plug Co
Air Shields Inc
B G Corp
Bunton Co. L. S.
Champion Spark Plug Co.
Dixon Ignition Corp
Edison-Splitdorf Corp
Electric Auto-Lite Co
Scintilla Magneto Div Bendix Aviation Corp
Simmonds Accessories, Inc.
Standard Aircraft Equipment Co.

Spars and Ribs

Dahlin Metal Products Co.
Fleetwings Inc.
Fletcher Aviation Corp
Hallow Aircraft Co.
Inter Continental Trade Co.
Johnson Aircraft Corp
McDonnell Aircraft Corp.
National Aircraft Materials Corp
Pioneer Aircraft Corp.
Pozer & Co J V O
St. Louis Aircraft Corp
Skyleg Aircraft Corp.
Southern Aircraft Corp
Threadgill Lumber Co. J Perry
United States Plywood Corp
Worcester Pressed Steel Co
Yoho & Hooker Lumber Co.

Springs

Ashmun Spring Corp
American Cable & Cable Co.
American Steel & Wire Co.
Anderson Flex Fiber Co
Associated Spring Corp.
Barnes Co. Wallace Div Associated Spring Corp
Barnes-Gibson Raymond Div of Associated Spring Corp
California Spring Co
Chatillon & Sons, John
Collins Supply & Equipment Co.
Eaton Mfg. Co
Fischer Spring Co. Chas
Hollister Cold Spring Mfg. Co
Jones Spring Co. W D
Kline Spring Co.
Lee Spring Co
Raymond Mfg. Co Div Associated Spring Corp.
Thomas Wire & Spring Co
Tuthill Spring Co.
Wichita Wire Products Co
Young Spring & Wire Corp L. A

Sprinklers

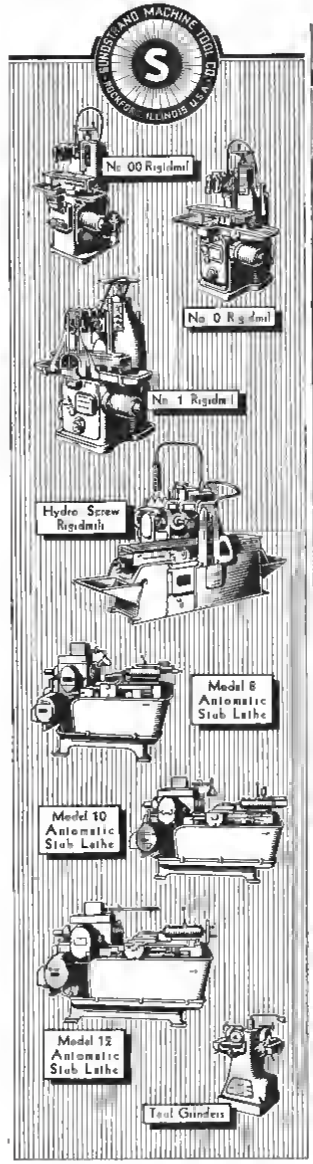
Grinnell Co
Rockford Sprinkler Co

Stampings, Metal

see also Parts, Sheet Metal

Ace Hardware Mfg. Corp
Acme Stamping & Mfg Co.
Alsie Mfg. Co
Aluminum Goods Mfg. Co
Auburn Central Manufacturing Corp
Austin Co. W. B.
B H Aircraft Co
Bullis Metal Products Co
Burton Dixon Raymond Div of Associated Spring Corp
Brunes Mfg. Co
Buhl Stamping Co
Cail Scott C. W
Carpenter Mfg Co E W
Chase Brass & Copper Co
Chicago Thrift Co
Cinch Mfg. Corp.
Cleveland Metal Stamping Co.
Collins Supply & Equipment Co
Cushion Seal Corp
Dahlstrom Metallic Door Co.
Dayton Type Inc.
Delance Stamping Co
Denning Mfg. Co.
Detroit Stamping Co

Sundstrand *Works* For Peace



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Reyman Mfg Co
Highbridge-International Co.
Holister Coil Spring Mfg Co
Kenyon Instrument Co
Kirk & Blum Mfg Co
Knaigslow Mfg. Co Otto
Kreiglow Stamping & Tool Co., E
Laminated Shim Co
Lansing Stamping Co
Lorentzen, Inc H. K.
Magney & Kuehne
Mechanical Development Co.
Mel L. Wood Corp.
Moore-Eastwood R Co
Meiers Metal Mfg. Co.
Mailing Mfg. Corp
Murray Corp. of America
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New Rart Stamping & Mfg Co
Northern Metal Products Co
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Polton MacGuyer Co.
Polink Corp. Joseph
Polink Mfg Co
Production Tool & Die Co
Raymond Mfg. Co Div Associated Spring Corp.
Republic Steel Corp
Reynolds Metals Co
Robertson Aircraft Corp
Rockwood Sprinkler Co
Rogers Mfg Co Dayton
St. Louis Aircraft Corp
Sal Metal Products Co
Shakeproof Lock Washer Co
Sparks Withington Co
Standard Aircraft Products Inc
Streeter Amet Co.
Technical Products Co
Teicher Mfg. Co
Tinnerman Engineering Co
Timm Aircraft Corp.
Transue & Williams Steel Forging Co
Twin City Tool Co
United Corr Fastener Corp
United Screw & Roll Corp
Vogue Mfg. Co
Wagner Mfg Co E R
Worcester Pressed Steel Co
Worcester Stamped Metal Co
Wrought Washer Mfg. Co.

Starters

Adel Precision Products Corp.
Aero Supply Mfg Co
Bogue Electric Co
Breese Corporations
Champion Aviation Products Co.
Bellpac Aviation Div Bendix Aviation Corp.
Electric Auto Lite Co
Federal Laboratories Inc.
General Armature Corp.
Jack & Heintz Inc.
Siebenthaler Div Aircraft Accessories Corp
Standard Aircraft Equipment Co.

Strainers—see Filters and Strainers

Struts and Shock Cord

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Bendix Products Div Bendix Aviation Corp.
Cleveland Pneumatic Tool Co
Dowty Equipment Corp
Fletcher Aviation Corp.
Goodrich Co B F
Hayes Industries Inc
Hoode Engineering Corp
Randall Graphite Products Corp
Reda Mfg. Co
Russell Mfg Co
United Aircraft Products Inc

Suits Flying—see Clothing and Uniforms

Superchargers and Equipment Cabin

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Lawrence Engrg. & Research Corp.
MacCulloch Engrg Co
General Electric Co
Lear Avia Inc
Turbo Engineering Corp

Surfaces Wing and Control

Curtl Sona C W
Fleetwings Inc.
Harlow Aircraft Co.
McDonnell Aircraft Corp.
St. Louis Aircraft Corp.
Stainless Steel Aircraft Corp.
United States Plywood Corp

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Arrow Hart & Hegeman Electric Co
Clarostat Mfg Co
Cole Harvey Co
Cramer Co R W
Daven Co
Deutschmann Corp Tobe
Douglas Mfg Co, H A.
Durakool Inc.
Zellmer Aviation Div Bendix Aviation Corp

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General Electric Co
Guardian Electric Mfg Co
Kellogg Switchboard & Supply Co
Leach Relay Co
Lewis Engineering Co
Mallary R Co P S
Mallory Insulation Co
Polink Corp. Joseph
Polink Mfg. Co
Pyle National Co
Quality Electric Co
Rowland Inc M H
Scintilla Magneto Div Bendix Aviation Corp
Standard Aircraft Equipment Co
Stator Co
Twin City Tool Co
Westgate Electric Co. Specialty Products Div
Westinghouse Electric & Mfg. Co.

Synthetics

American Cellulose Co
American Phenolia Corp
Avondale Chemical Co.
Bakelite Corp
Brooklyn Varnish Mfg Co
Celanese Corp
Celluloid Corp
Central Process Corp
Continental Diamond Fibre Co
Connecticut Hard Rubber Co
Detroit Gasket & Mfg. Co
du Pont de Nemours & Co E. I. Plastics Dept.
Egyptian Lacquer Mfg. Co
Firestone Tire & Rubber Co
Formica Insulation Co
Fuller & Co W F
General Electric Co
Goodall Rubber Co
Goodrich Co B F
Hilo Varnish Corp
Irvington Varnish & Insulator Co
Monsanto Chemical Co., Merrimac Div
Plaskon Co
Pyroxylin Products Inc.
Resinoid Corp
Seibertling Rubber Co.
Spalding Fibre Co
Standard Rubber Co.
Wesley Lacquer Co
Westinghouse Electric & Mfg. Co

Systems Aircraft Fuel

American Bosch Corp
Bendix Products Div Bendix Aviation Corp.
Lunkenheimer Co
Motor Improvements Inc.
Pratt & Whitney
Pump Engineering Service Corp
Romec Pump Co
Steel Products Engineering Co

Systems, Airport Fuel

Aqua Systems Inc
Am Equipment Corp
Hoover R Co S F
Rutlar Mfg Co.
Columbian Steel Tank Co
Consolited Instruments Corp
Flotation Systems Inc.
Gilbert & Barker Mfg Co
Healthemaker Corp
Manhattan Rubber Mfg Div of Raybestos Manhattan Inc
Motor Improvements Inc.
Protecto Seal Co.
Pump Engineering Service Corp
Romec Pump Co
Steel Products Engineering Co
Smith Lubricator Co
Twin City Tool Co.
United States Fire Protection Co
Vogue Mfg. Co
Yale & Towne Mfg. Co.

Systems Sprinkler—see Sprinklers

Systems Water—see Plumbing Fixtures and Fittings

Turbosuperchargers—see Instruments

Tanks, Fuel

Aero Trader Co.
Aircraft Development Co.
Aluminum Co. of America
Aluminum Goods Mfg Co
American LaFrance Foamite Corp
B H Aircraft Co
Bonney Mfg Co
Bethlehem Steel Co.
Brewster Aeronautical Corp.
Reid Stamping Co
Curtl Sona C W
Columbian Steel Tank Co.
Dahlstrom Metallic Door Co
Firestone Tire & Rubber Co
Fluflavings Inc.
Fleetwing Aviation Corp
Goodrich Co B F
Harlow Aircraft Co
Heron Manufacturing Co
Independent Iron Works
Ingalls Iron Works Co
International Engineering Works Inc
Kay Products Co
Kirk & Blum Mfg Co.
Mel L. Wood Corp
National Postal Meter Co

Photo Record Equipment Co.
Polish Mfg. Co.
Porcupine Co
Robertson Aircraft Corp
Ryan Aeronautical Co
St Louis Aircraft Corp
Standard Aircraft Products Inc
Tennessee Aircraft Institute Inc
United States Rubber Co
Virginia Rubatex Corp

Terminals Tie Rod—see Fittings Structural

Tires and Tubes

Firestone Tire & Rubber Co.
Imperial Tire R Rubber Co
Goodrich Co B F
Goodyear Tire & Rubber Co
Mesabi-ron Products Co.
United States Rubber Co

Tools Machine—see Equipment, Shop

Tractors and Snow Removal Equipment

Cletrac Transportation Co
Fisher Industrial Truck Div of Baker Raulang Co
Caterpillar Tractor Co.
Clark Tractractor Div Clark Equipment Co.
Cleveland Tractor Co
Four Wheel Drive Auto Co.
International Harvester Co.
Kissel Mfg Co
Oliver Farm Equipment Co
Rocky Mountain Steel Products, Inc.
Snow Removal Equipment Co
Tumotor Co

Trainers

Cessna Aircraft Co
Ensign Aircraft Corp
Fleetwings Inc.
Fletcher Aviation Corp.
Harlow Aircraft Co.
Interstate Aircraft & Engrg. Corp.
J V W Corp (Distributor)
Johnson Aircraft Corp
Link Aviation Devices Inc.
Pitcairn Aircraft Corp.
Piquere Aircraft Corp.
St Louis Aircraft Corp
Skylark Aircraft Corp
Timm Aircraft Corp

Tubes—see Tires and Tubes

Tubing (Flexible)

Air Transport Equipment Inc.
Aircraft Steel & Supply Co
American Brass Co
American Metal Hose Div American Brass Co.
Breeze Corporations
Chase Brass & Copper Co
Chicago Metal Hose Corp
Bellpac Aviation Div Bendix Aviation Corp
Flex-O-Tube Co.
Forsyth Metal Goods Co.
Hamilton Co
Packless Metal Products Corp
Pennsylvania Flexible Metallic Tubing Co
Resistoflex Corp
Saylor Electric Products Corp
Seamless Co
Shakespeare Products Co
Titeflex Metal Hose Co
United Metal Hose Co.
United Wire R Supply Corp
Weatherhead Co
Wolverine Tube Co

Tubing (Rigid Non Ferrous)

Aircraft Steel R Supply Co
Aluminum Co of America
American Brass Co.
Bunney Mfg. Co
Chase Brass & Copper Co
Chicago Metal Hose Corp.
Colonial Alloys Co.
Dahlstrom Metallic Door Co
Dow Chemical Co
Durametals Metals R Supply Co
Fornica Insulation Co
National Copper & Smelting Co
Nicalumin Co
Pacific Metals Co
Phosphor Bronze Smelting Co
Revere Copper & Brass, Inc.
Reynolds Metals Co.
Superior Tube Co
United Wire R Supply Corp
Waite & Co E
Westinghouse Electric & Mfg. Co
Wilmington Fibre Specialty Co.
Wolverine Tube Co.

Tubing (Rigid Steel)

Aircraft Steel R Supply Co
Baker Steel & Tube Co
Bethlehem Steel Co.
Briggs Mfg Co
Carpenter Steel Co
Columbia Steel Co
Dahlstrom Metallic Door Co
National Tube Co
Ohio Seamless Tube Co
Pittsburgh Steel Co
Republic Steel Corp.
Rverson & Son Inc. Joseph T
Service Steel Co
Steel Forming Corp
Summerill Tubing Co
Superior Tube Co.
Timken Roller Bearing Co.

Tubing Rubber—see Rubber

Tubing Streamline—see Tubing (Rigid Non-Ferrous) also Tubing (Rigid Steel)

Uniforms—see Clothing and Uniforms

Valves

Aerolorque Co
Adel Precision Products Corp
Aeronautical Mfg. Corp.
Aircraft Engineering Products Inc
Airresearch Mfg Co
Aluminum Industries Inc
American LaFrance Foamite Corp.
Am Equipment Corp.
Burdett Mfg Co
Hill Mfg Co
Dowty Equipment Corp
Eaton Mfg Co
Fairbanks Co
Firestone Inc.
Homestead Valve Mfg Co.
Hoof Products Co
Interstate Aircraft R Engrg Corp
Jalina Motor Products Co
Kenyon Instrument Co.
McQuay-Norris Mfg. Co.
Milwaukee Valve Co
Parker Appliance Co
Pump Engrg Service Corp.
Scaled Power Corp.
Stebeclhaler Div Aircraft Accessories Corp.
Standard Aircraft Products Inc
Tagliabue Mfg. Co, C J
Thompson Products Inc
United Aircraft Products Inc
Vickers Inc.
Walworth Co
Weatherhead Co
Wilcox-Rich Div of Eaton Mfg. Co

Washers, Shock

Anderson Flax Fiber Co
Gandrich Co B F
Houghton & Co E F
Linear Packing & Rubber Co
Lord Mfg Co
Standard Rubber Co.
Streeter Amet Co
Thompson Products Inc.
Twin City Tool Co

Wheels and Brakes

Bendix Products Div Bendix Aviation Corp
Dayton Wheel Co
Federal Aircraft Works
Firestone Tire & Rubber Co
General Aircraft Supply Corp.
Goodall Tire & Rubber Co
Gunera Metal Wheel Co.
Goodrich Co B F
Goodyear Tire & Rubber Co.
Hayes Industries Inc
National Acme Co
Shinn Devices Co
Wesley Aircraft Corp
Wagner Electric Corp.
Warner Aircraft Corp

Wheels Control

Kay Products Co
Valley Accessories Corp.

Wheels and Skids Tail

Air Transport Equipment Inc.
Aircraft Associates Inc
American Tube Bending Co
Dowty Equipment Corp.
Firestone Tire & Rubber Co
Goodall Tire R Rubber Co
Gunera Metal Wheel Co.
Goodrich Co B F
Goodyear Tire R Rubber Co
Harlow Aircraft Co
Hayes Industries Inc
Hoode Engineering Corp
Interstate Aircraft R Engrg. Corp
Kay Products Co
National Acme Co
Shinn Devices Co
Tennessee Aircraft Institute, Inc
Valley Accessories Corp

Wire and Cable Electrical

AC Spark Plug Div General Motors Corp.
Accurate Insulated Wire Co
American Phenolia Corp
American Steel R Wire Co
Anaconda Copper Mining Co
Belden Mfg. Co
Boston Insulated Wire & Cable Co.
Chase Brass & Copper Co
Colyer Insulated Wire Co.
Crescent Co
Electric Auto-Lite Co Wire Div
General Electric Co
Kellogg Switchboard & Supply Co.
Okonite Co.
Rockbottom Supp Co John A
Ramsel Cord & Wire Co
Stanflex Wire & Cable Co.
United States Rubber Co.

Wire and Cable Structural

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Page Steel & Wire Dlr American Chain & Cable Co
Phosphor Bronze Smelting Co.
Republic Steel Corp
Revere Copper & Brass Inc.
Rochester Ropes Inc
Roebling's Sons Co John A
Wickwire Spencer Steel Co

Wood and Plywood
see also Parts Fabricated Plywood

Air Transport Equipment Inc
Algoma Plywood & Veneer Co.
Auld Co D L
Barnaby Veneer Co
California Panel & Veneer Co.
Catalin Corp
Haves Plastics & Chemicals Inc.
Eggers Plywood & Veneer Co F
Fleischer Aviation Corp
Formica Insulation Co
Harbor Plywood Corp
Haskelite Mfg. Corp.
Inter Continental Trade Co
Mc L-Wood Corp.
Morgan Lumber Products Co
National Aircraft Materials Corp
Paxton Lumber Co Frank
Plywood Products Corp
Percy & Co J V O
Rolfe Lumber & Veneer Co.
Simmon & Son Inc. E. J
Technical Ply Woods
United States Plywood Corp.
Willis Brothers
Yoke & Hooker Lumber Co

AVIATION SCHOOLS

Continued from page 182

National Aeronautic Council Inc., 37 W 47th St, New York N Y
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Registrar—H. J Maher
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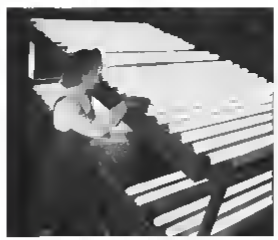


IN THIS "life-test" G-E MAZDA F *lamps burst shy and high to help assure the high standards set by G-E research*

Q. *What are its advantages for me?*
A. Its higher efficiency and greater coolness permit offices, factories, and tool rooms to have higher levels of illumination, with less glare, than has ever before been practical. Since people see faster, with less fatigue in better light, you should expect increased production, reduced spoilage, fewer mistakes, greater safety, and improved employee morale when fluorescent lighting has been properly installed.

Q. *Why should I insist on G-E MAZDA Fluorescent Lamps?*
A. G-E MAZDA F lamps are the latest product of General Electric Research and Development — a combination which for 61 years has been giving America more and more light at lower and lower cost. Since G-E MAZDA F lamps were introduced in 1938, efficiency has been increased as much as 40% and prices reduced as much as 45½! Today's G-E MAZDA F lamps are made to give maximum light output for current consumed—made to *stay brighter longer!*

Q. *What about fixtures?*
A. You can choose from a wide variety of individual styles. General Electric cooperates with many fixture manufacturers, and does not make fixtures itself. Your G-E MAZDA lamp distributor can supply styles and types to fit every store — complete with G-E MAZDA F lamps, all ready to use.

Fixtures bearing the Fleur-O-Lier or RLM tag assure you of maximum fixture performance because they are certified by Electrical Testing Laboratories to comply with exacting specifications. Such certification may be obtained by any fixture manufacturer whose product meets required specifications.

HERE *a skilled technician places a 100-watt G-E MAZDA F lamp in giant "electric eye" that measures light output.*

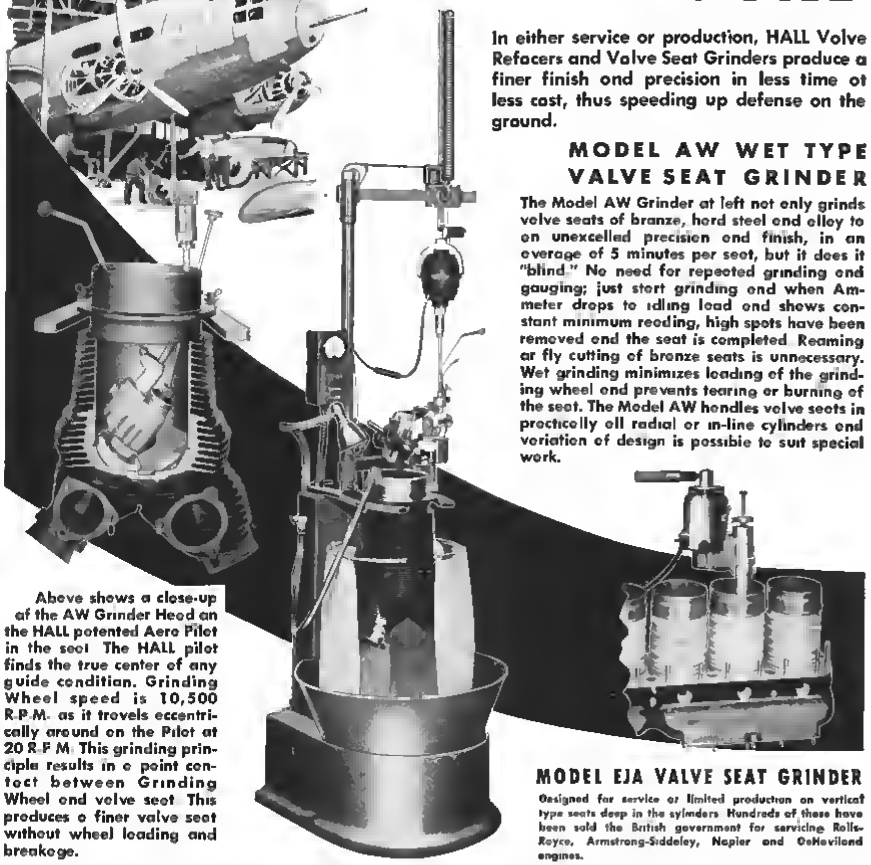
THIS MACHINE *tests brightness of fluorescent powders used in G-E MAZDA F lamps to assure maximum light output throughout life*

Q. *What should I do now?*
A. See your G-E MAZDA lamp distributor. He can help you choose the fluorescent fixtures that exactly meet your needs, and he can draw on all the resources and experience of the General Electric Company to see that you get the best possible fluorescent lighting properly engineered to your needs — at the lowest possible cost. Your local lighting company can also give you valuable advice.

G-E MAZDA F LAMPS *are recommended for use only with equipment providing good power factor, such as Fleur-O-Liers or RLM Industrial fixtures. The label shown here identifies Fleur-O-Lier fixtures, made by over 40 experienced manufacturers.*

G-E MAZDA LAMPS
GENERAL ELECTRIC

IN PRODUCTION
HALL EQUIPMENT
ON THE GROUND



In either service or production, HALL Volve Refacers and Valve Seat Grinders produce a finer finish ond precision in less time ot less cast, thus speeding up defense on the ground.

MODEL AW WET TYPE VALVE SEAT GRINDER

The Model AW Grinder at left not only grinds volve seats of bronze, hord steel ond olloy to on unexcelled precision ond finish, in an overage of 5 minutes per seot, but it does it "blind." No need for repeoted grinding ond gauging; just stort grinding ond when Ammeter drops to idling load ond shows constant minimum reoding, high spots have been removed ond the seat is completed. Reaming or fly cutting of bronze seats is unnecessary. Wet grinding minimizes loading of the grinding wheel ond prevents tearing or burning of the seat. The Model AW hondles volve seots in prociocolly oll radial or in-line cylinders ond voriation of design is possible to suit special work.

Above shows a close-up of the AW Grinder Heod an the HALL potented Aero Pilot in the seot. The HALL pilot finds the true center of any guide condition. Grinding Wheel speed is 10,500 R.P.M. as it trovels eccentrically around on the Pilot at 20 R.P.M. This grinding principle results in o point contoct between Grinding Wheel ond volve seot. This produces o finer valve seot without wheel loading and breokoge.

MODEL EJA VALVE SEAT GRINDER

Designed for service or limited production on vertical type seats deep in the cylinders. Hundreds of these have been sold the British government for servicing Rolls-Royce, Armstrong-Siddeley, Napier and DeHaviland engines.

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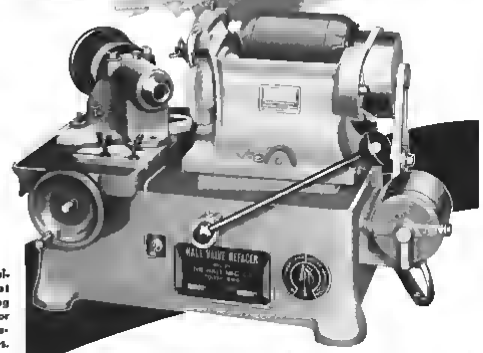
HALL

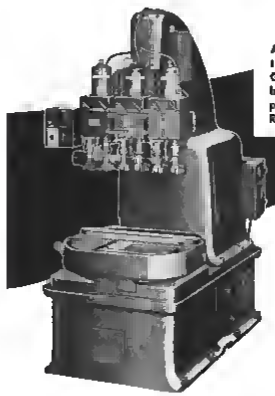
OR SERVICE
SPEEDS UP DEFENSE
- IN THE AIR

The finer finish ond precision ottained with HALL Equipment meons improved engine performance and maximum power ot all altitudes, thus it speeds up defense in the air.

MODEL 80-A WET TYPE VALVE REFACER

A wet type Volve Refocer thot produces a volve foce of o precision ond finish to motch the precision ond finish of the volve seot ground with HALL Equipment. Micrometer Feed permits operator to know exact omount of metal being removed. individuol motor for Workheod has rheostot control, providing variable speeds. Workheod con be accurotely locoted for 10 different angles. For example valves moy be refoced accurotely to 29° 30' ond 43° 30', etc. Speciol design collet prevents grinelling of volve stem. These and many other features moke the 80A the finest Refocer for servicing airplane valves.





At left is shown multiple spindle Seat Grinder of type being built for Packard for production of Rolls-Royce Merlin Engines.

A PARTIAL LIST OF USERS OF HALL VALVE SEAT GRINDERS AND VALVE REFACERS

Ford Motor Co. for production of P & W engines, Ranger Engineering, Lycoming Division Aviation Mfg. Corp., Aircroft industries, Eastern Air Lines, inc., Wright Aeronautical Corp., Pon-American Airways, inc., Continental Motors, Aircraft Factory Philadelphia Navy Yard and other major Naval Repair Depots, War Dept. Air Corps at Wright Field and other major Army Repair Depots; in Canada: Pratt & Whitney Aircraft at Montreal, Ottawa Car and Aircraft Co. and others. England: Approved by British Air Ministry for use in service by R. A. F. and for production of Rolls-Royce, Armstrong-Siddeley, Napier and DeHaviland engines; South African Railways, Royal Dutch Air Lines, Roumanian Government, individual factories in France and others.

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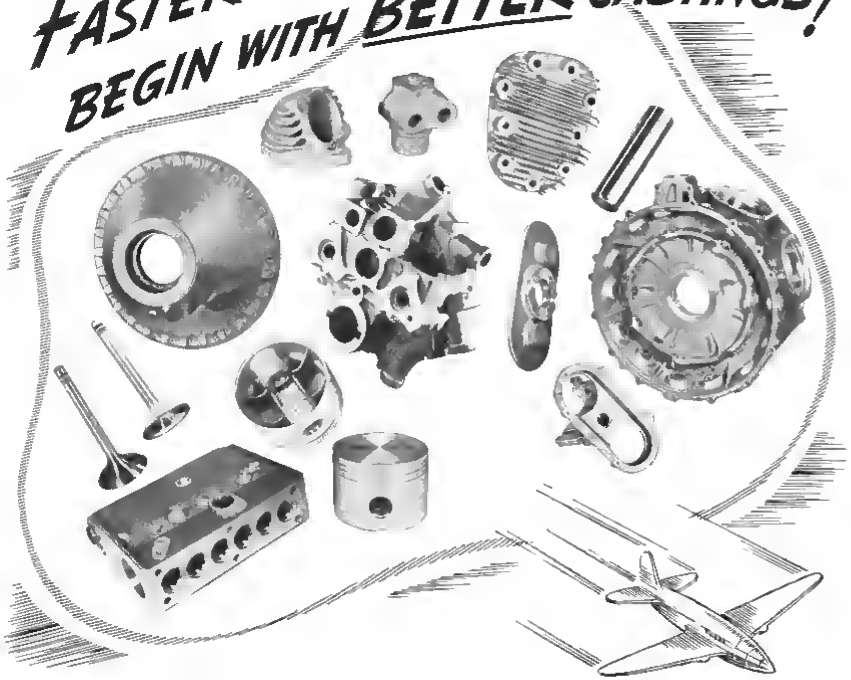

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BENDIX RADIO

BENDIX AIR RADIO NEWS

EBRUARY 1941 Published by BENDIX RADIO CORPORATION, Baltimore, Md. Cable Address BENRAD

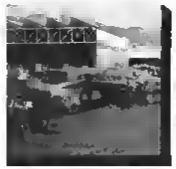
BENDIX RADIO ON LOCKHEED FLEETS AT HOME AND ABROAD

Receivers, Transmitters and Compasses Standard Equipment on Many Lockheed Airliners and Military Craft

Reliability Proved In All Types of Service

(Photo Courtesy Lockheed)

The Lockheed Hudson Bomber, now being constructed for the British, has won its spurs in actual combat with the Royal Air Forces of Britain and Australia. This bomber is noted for its ability to withstand direct hits by anti-aircraft fire, and is being used by the British for reconnaissance work. Many Lockheed Hudsons are equipped with Bendix Transmitters, Receivers and Radio Compasses.



nal Tune-Up of a flight Lockheed Hudson ombers destined for rvice with the British oyal Air Force. Bendix nolded Radio Comss Loops, part of the endix Equipment on ese Bombers, can be en atop their cabins

Lockheed Bombers aff for service overseas, hned up at the Burbank Airport, ready for deliverys. Lockheed Hudson Bombers equipped with Bendix Radio are now in service with the British and Australian Royal Air Forces.

Bombers Go Ta Sea! How Lockheed Hudsons are shipped abroad, canvas-covered and with windows, doors and ventilators taped and sealed. The entire craft is sprayed with a special corrosion-resisting compound to protect all parts from moisture.

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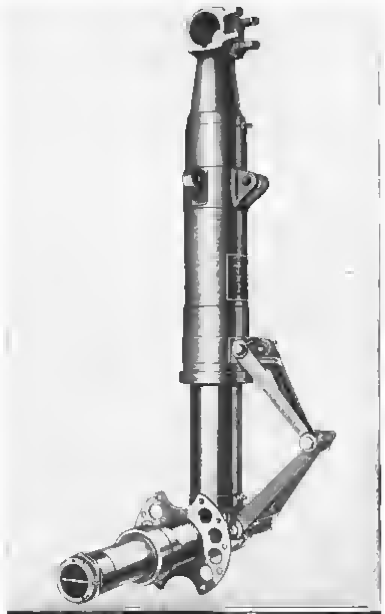
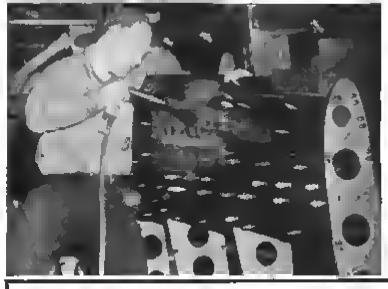
BENDIX RADIO—STANDARD FOR THE AVIATION INDUSTRY

GENIUS—AMERICAN STYLE

Cleveland Pneumatic Tool's Contributions to America's Coming Air Supremacy





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Second is the Cleco line of aircraft tools—particularly the specially designed riveters and squeezers for wings and fuselage fabrication. These riveters and squeezers—more than five dozen in number—offer aircraft manufacturers the *right* tool for every riveting operation.

Last, but not least, are those small but astonishing gadgets known as Cleco Sheet Holders. Almost as simple as clothespins, they hold sheets in position during riveting. They eliminate punching and drilling special holes and the use of bolts and nuts. They are easily inserted and removed with a special tool. *They step up production.*

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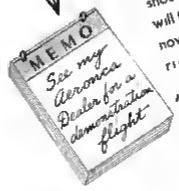

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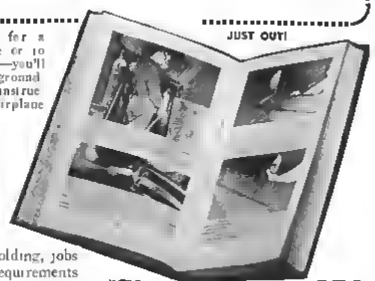

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1. *The Acrotorque All Weather Windshield Wiper* is a safety unit of prime importance in keeping aircraft windshields clear during rain, snow and icing conditions. The device is of electromagnetic overthrow, hydraulically operated and transmits its abundance of power to the wiping blades. The design embodies simplicity of construction, lightness of weight and flexibility of mounting.

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Production has been tuned to the needs of the day and satisfactory deliveries can be made.

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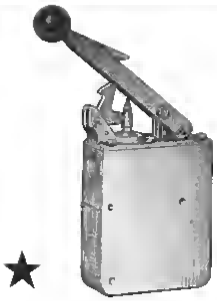

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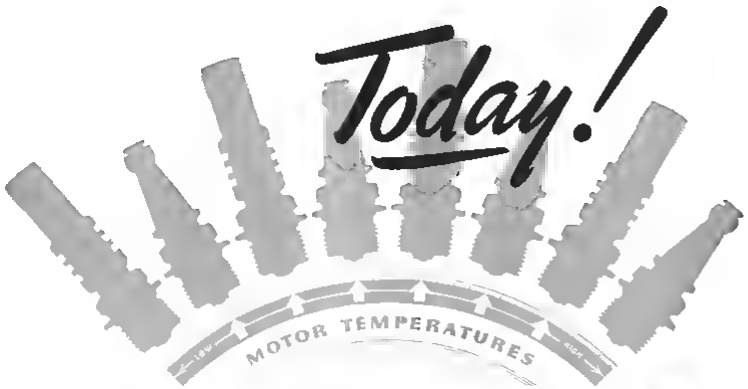
Today!

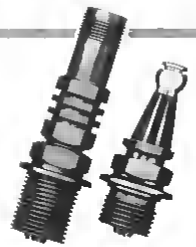


Thirty years devoted to the development and manufacture of spark plugs exclusively has earned for Champion Spark Plugs a world wide reputation for quality, dependability and better performance that is without equal The quality standards of Champion Spark Plugs have never been at a higher level than today, with the result that more engineers are looking to Champion for the most advanced spark plugs for aircraft, cars, trucks, tractors and marine engines

In aviation the production of Champion's well known mica types has been enormously stepped up to meet the requirements of Army, Navy and commercial orders

Production is likewise now under way on the recently announced Champion ceramic-type spark plug which has so successfully met the extreme stresses and service requirements of the latest high-output engines

We believe that the Champion policy of devoting all of its resources to research, engineering and manufacture of spark plugs, and nothing but spark plugs, is the reason why Champion is able to provide the aviation industry with tomorrow's spark plugs today.



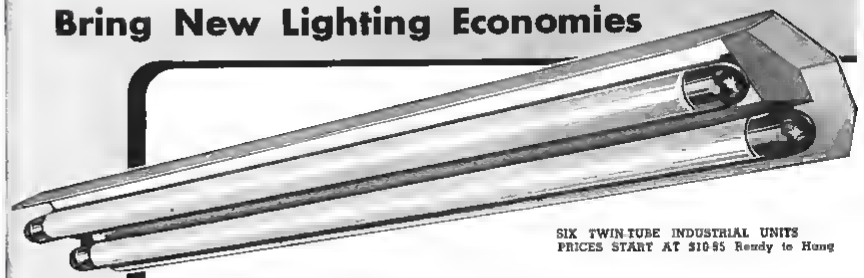
You're always ahead with Champion!

SPARK PLUGS

Streamliner

EFFICIENCY UNITS

Bring New Lighting Economies



SIX TWIN-TUBE INDUSTRIAL UNITS
PRICES START AT $10.95 Ready to Hang

New FLUORESCENT Construction Eliminates Cumbersome Weight Lowers Installation Costs

Order Direct from Manufacturer at UNBEATABLE LOW PRICES

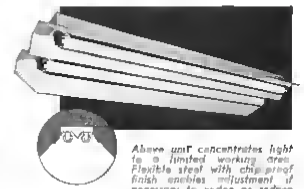
Get highest fluorescent lighting efficiency at an unbeatable low cost. Streamliners are built for heavy duty service; they are as far advanced in their field as the latest planes off the production lines . . . streamlined for beauty, streamlined for efficient distribution of light, streamlined for sleek compactness and light weight. Streamliners are sturdily built of heavy gauge galvanealed steel, light and rustproof . . . takes dureble, flexible finish that will not chip. Finished in our special process white that reflects maximum amount of light. Electrical parts are Underwriters' Laboratories approved and only nationally known parts are used. Have high power factor correction and stroboscopic effect correction.

Volume Production
Prompt Deliveries

This equipment is scientifically perfected built in large volume at low production costs. Immediate shipments on 66 models . . . complete lines for industrial plants drafting rooms and offices We ship coast to coast, also export Join the thousands who enjoy our straight-line-sales policy that saves you distribution costs Write today for our comprehensive catalog that now makes it as easy to order Fluorescent as buying incandescent

FREE TRIAL

Try our lights five days, if not 100% satisfied back they come at our expense



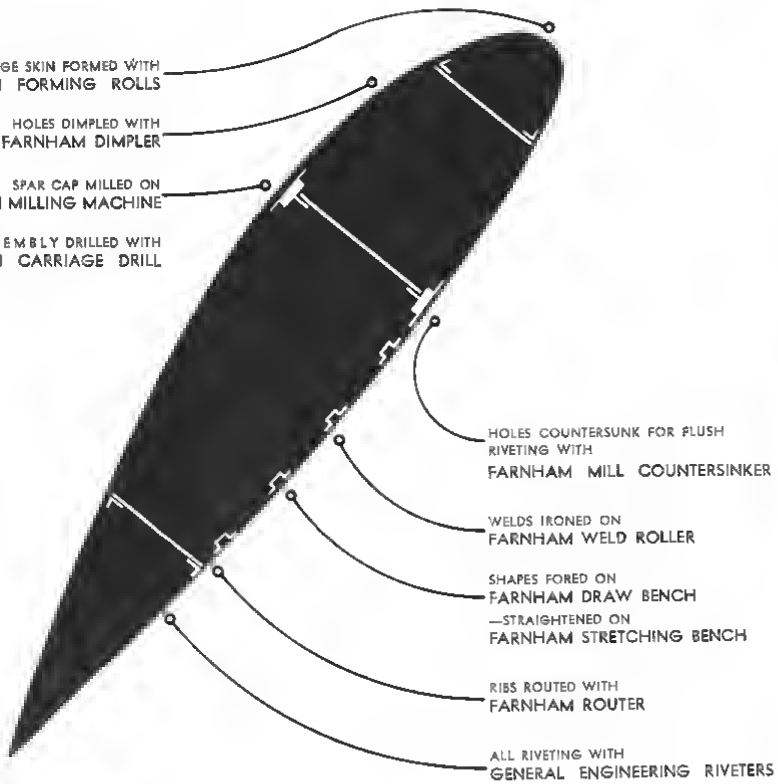
Above unit concentrates light to a limited working area. Flexible steel with chip-proof finish enables adjustment of necessary to widen or reduce span of light as possible future changes of use

W · H · LONG COMPANY

423-431 NORTH CLARK STREET · CHICAGO

Designers • Engineers LONG FLUORESCENT LONG Manufacturers • Est. 1911

WINGS with FARNHAM Production Machines



FARNHAM MANUFACTURING CO. 1646 SENECA ST., BUFFALO, N. Y.

Sales Offices: 11 W. 42nd ST., NEW YORK CITY — 618 McKERCHEY BLDG., DETROIT

10-YEAR-OLD WACOS in active service

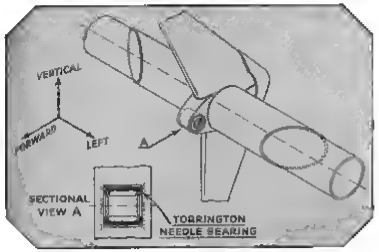
● Built in 1930 and 1931, these Waco trainers NC864V and NC11267 are in daily use at the United Flying Schools of America, Inc., Vail Field, Los Angeles, California. Alongside of four new trainers purchased early in the fall of 1940 by the same school, the old Wacos accept their assignments of student flyers.

What more conclusive evidence, could be asked, of Waco's sound design, experienced engineering and competent workmanship . . . of the Waco's assured, profitable life?

For your new trainers specify the trainer with an established record . . . WACO . . . one of the oldest names in aviation. Waco Aircraft Company, Troy, Ohio, U. S. A. Cable address: Waco Troyohio.

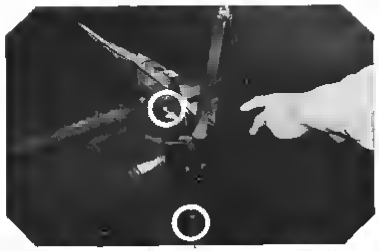
United Flying Schools of America, Inc., own six Wacos. In addition to their commercial students' course and their quotas of primary CPTP students, they are now training an advance instructor refresher students and thirty collegiate students

TORRINGTON NEEDLE BEARING SIMPLIFIES DESIGN, CUTS MAINTENANCE COSTS IN REARWIN CLOUDSTER



1 Rearwin Aircraft & Engines, Inc., selects Torrington Needle Bearings for points of greatest strain in elevator and rudder assemblies of its Cloudster. View shows Needle Bearing location in elevator. "Freedom from servicing and replacement makes the Needle Bearing ideal for these hard-to-reach points," reports R. W. Rummel, Rearwin's Chief Engineer.

2 Assembly design is simplified—with consequent savings in weight—by the use of the compact Torrington Needle Bearing. The simply designed housing is welded in place and the bore reamed to size. Holding the Needle Bearing in line with a cylinder gauge, this Rearwin mechanic aptly demonstrates how its small size and unit construction facilitate assembly.



3 Circles show location of the Needle Bearings in the completed tail assembly. High radial load capacity and long service life, outstanding features of the Needle Bearing, are essential at these locations from a maintenance standpoint.

4 Torrington Needle Bearings demonstrate their ability to withstand severe service in rigid ground tests on the Cloudster. Sand and shot load the tail surfaces to 1,318 pounds—over 3 times the maximum load necessary to balance the plane in flight.

If you have a bearing problem where high load capacity, small size, light weight, ease of assembly and lubrication are vital considerations, investigate the advantages of the Torrington Needle Bearing. Our Engineering Department will be

glad to work with you in adapting these advantages to your assemblies. For detailed information, write for Catalog No. 114. For Needle Bearings to be used in heavier service, consult our Engineering Department for special types and designs.

THE TORRINGTON COMPANY, TORRINGTON, CONN., U. S. A. • ESTABLISHED 1866

Makers of Needle and Ball Bearings

New York Boston Philadelphia Detroit Cleveland Chicago London, England

TORRINGTON NEEDLE BEARING

$\frac{5000}{500} = 10$

a Star for Performance

Republic ENDURO Heat-Resisting Steel in United Air Lines Air Preheater Cluster, after operating 10 TIMES AS LONG as the material previously used, is still in service!

And this service is anything but easy. The hot exhaust gases inside the cluster, designed and built by United Air Lines, raise the temperature of the metal to 1300 degrees. Air passing around the outside of the tubes is sky temperature—often well below zero. The service is so tough, in fact, that the metal originally used required replacement after 500 hours. And that was a good figure when consideration is given to the number of hours in the air of other parts of an air liner.

Then Republic ENDURO* Heat-Resisting Steel—a star performer wherever high temperatures are a factor—was given a trial. It has been in service now for better than 5000 hours—10 times as long as the material previously used—WITH NO INDICATION OF FAILURE. As a result, ENDURO now is standard for replacements.

Keep this short, true story in mind when you need a metal that will resist high temperatures and corrosion—that provides a high strength to weight ratio—for fire walls, collector rings, exhaust stacks, boilers, cartridge starters, battery compartments, lavatory compartments, galleys and a host of other applications.

Literature giving complete technical information on the various grades of Republic ENDURO Stainless and Heat-Resisting Steels will be sent on request. Write Republic Steel Corporation, Alloy Steel Division, Massillon, O.; General Offices, Cleveland, O.

BERGER MANUFACTURING DIVISION • NILES STEEL PRODUCTS DIVISION • STEEL AND TUBES DIVISION
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REPUBLIC STEEL

*Reg. U.S. Pat. Off.

MADE BY... **Republic**

. . . . pioneer in the development of electric furnace steels—both alloy and stainless—and, today, the world's largest producer of aircraft quality steels.

BREAK THE BOTTLENECK OF AIRCRAFT PRODUCTION

Locate New Plants INLAND*

Illinois Gets Big Airplane Engine Plant

An airplane engine plant in Illinois to employ 4,000 persons is an expansion [illegible] Studebaker

Industrial Advantages of Illinois Adaptable to Defense Production

Speed-up of the National Defense Program has been accelerated by the decision of the Studebaker Corporation to build a plant in Illinois for the manufacture of airplane engines and parts, in order to take full advantage of the outstanding facilities of this State for stepped-up production.

Reservoir of skilled labor available in Illinois was one of the important factors in selection of this State for site of new plant, officials stated. Other factors prominence of Illinois in the Metal Working Industry assuring adequate supply of needed machines, tools, and service, proximity of large steel mills resulting in prompt, economical service

***THE LOGICAL LOCATION IS**

Illinois

8 GOOD REASONS For Locating Aircraft and Parts Plants In Illinois

1 GOOD LABOR SUPPLY. Illinois has 2,500 metal working plants employing 300,000 wage earners proof of the adequate supply of workers of the type required in aircraft and parts manufacturing.

2 MATERIALS AND PARTS. Illinois is located close to abundant sources of supply for materials and parts—is in the center of steel and non ferrous metal foundries and machine tool manufacture so important to this industry.

3 TRANSPORTATION. Illinois is the center of railroad and air transportation, with direct lines to every section of the State and country—has the finest system of paved roads of any state.

4 CENTRAL LOCATION. Illinois is near the geographical center the industrial center and center of population of the Nation, and is the hub of the huge Middle West market.

5 IDEAL TESTING CONDITIONS. Illinois' wide range of climate permits testing under all flight conditions. Both land and water ports are available adjacent to manufacturing sites.

6 LEAST VULNERABLE LOCATION. Illinois is a safe distance inland from all coasts—a vital consideration for uninterrupted operations under all circumstances.

7 A LEADER IN AVIATION RESEARCH. Illinois has extensive facilities for research in aviation, with several great schools specializing in this important function.

8 MILITARY TRAINING BASES. United States Army aviation training bases in Illinois (Chanute Field at Rantoul, and Scott Field at Belleville) permit close coordination of research, design, manufacturing, testing, and determination of requirements for both commercial and military use.

Write the Illinois Development Council at Springfield today, for a special report on the advantages Illinois offers manufacturers of aircraft, engines, parts, and accessories. Please list any special problems or requirements in labor, materials or manufacture, in order that a truly practical and informative report may be submitted for your consideration. Your inquiry will, of course, be kept strictly confidential. Write—

ILLINOIS DEVELOPMENT COUNCIL • STATE HOUSE • SPRINGFIELD, ILLINOIS

ILLINOIS

THE STATE OF BALANCED ADVANTAGES

VOUGHT-SIKORSKY

"MODEL OS2U-1"

OBSERVATION-SCOUT-PLANE

is Equipped with

NORMA-HOFFMANN PRECISION BEARINGS

This latest product of Vought-Sikorsky Aircraft (Division of United Aircraft Corporation), Stratford, Conn., is being produced under large quantity orders for the U. S. Navy. Designed primarily as a seaplane to be launched from battleship or cruiser catapult, it is convertible to a landplane for service ashore. Unique design features give this monoplane type the lift and controllability at low speeds hitherto realized only in the slower biplane type.

In achieving this result, NORMA-HOFFMANN PRECISION BEARINGS are employed in the controls—on surface control push-and-pull rods, on engine control units and control rods, and on aileron, flap, tabs, rudder and stabilizer hinges—as well as in cockpit sliding sections.

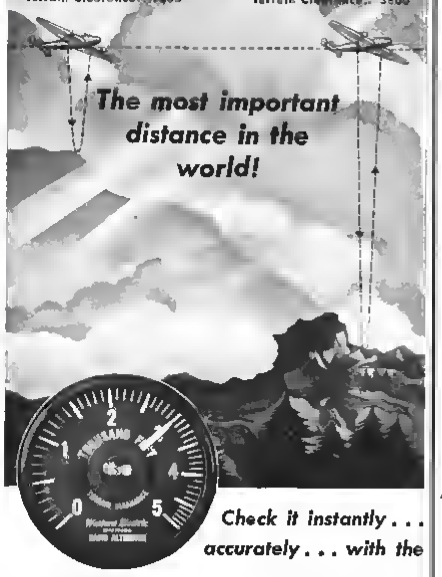
Identified with the aircraft industry from the earliest days of aviation, NORMA-HOFFMANN PRECISION BEARINGS are today used by practically every American builder of aircraft and aircraft equipment (including the U. S. Government)—whether for military, commercial or private use. There is a PRECISION BEARING for every load, speed and duty, available in 108 series and more than 3000 sizes.

Write for Catalog

LET OUR ENGINEERS WORK WITH YOU

NORMA-HOFFMANN BEARINGS CORP'N., STAMFORD, CONN., U.S.A.

To the Pilot . . .

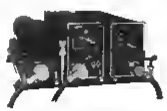


Check it instantly . . . accurately . . . with the

ABSOLUTE ALTIMETER

Day and night, clear and stormy, the Western Electric Radio Altimeter gives you continuous, instantaneous, accurate readings of your terrain clearance. It's not affected by atmospheric pressure, temperature, humidity, cloud layers or static.

With the Radio Altimeter, altitude becomes height-above-the-ground . . . that *vital distance* between your plane and the terrain beneath. Now at a glance you can get this invaluable, *definite* information you always wanted and needed! Get full details about the Absolute Altimeter. Write Western Electric Co., Dept. 9640AD, Kearny, N. J.



Transmitter sends out radio wave which is reflected back from earth to receiver. Elapsed time for "roundtrip" is converted into absolute altitude—instantly shown on panel meter.

C. A. A. Type Certificates have been granted on the 158 Radio Altimeter apparatus elements.

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AVIATION RADIO . TELEPHONE

—AT "AVIATION HEADQUARTERS"

Those who fly have discovered that there is one place in New York City where they not only meet more of their friends but meet them more often — *and at a The Lexington!* In fact, so many of the aviation fraternity congregate at "New York's friendly hotel" that it is popularly regarded as the industry's metropolitan headquarters. On our part we are particularly proud to have you stop with us—and wish you many more "happy landings" here!

Charles E. Rochester, V. P. & Mgr. Dir.

Hawaiian Room

Hotel Lexington
LEXINGTON AVE. AT 48TH ST., NEW YORK, N. Y.

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(Standard equipment on most Army and Navy Planes)

Unimaze Air Filter and Spark Arrester

Approved by Fire Underwriters Labs.

You get positive protection against abrasive dust and grit when you insist upon AIR-MAZE! The scientifically built-in density of the all metal vibration-proof filter media assures 99.83% efficiency and yet the restriction is so low that the desirable intake ram effect is in no way impaired.

Then, too, AIR-MAZE is an effective water eliminator and NBFU approved Spark Arrester.

Keep your engines at top-notch performance with AIR-MAZE. Write for details.

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announces the acquisition of Gem City Sheet Metal & Manufacturing Company and offers the following products

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THERMOSTATS	COCKPIT EXTENSION LAMPS
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Every Wyman-Gordon forging is under laboratory control from raw material to finished product. They are always guaranteed forgings.

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FOR THE NERVE CENTER OF THE AIRCRAFT ENGINE

Bendix-Scintilla relies on Wilco *Aeralloy Contacts*

And no wonder! For this leading supplier of magnetos for the aircraft industry builds quality into every part of its product. It knows that Wilco Aeralloy is refined, alloyed and then hand tooled by processes developed and perfected to meet the extraordinary precision requirements of the aircraft industry. Only precision craftsmen, metallurgists and machinists are intrusted with fabrication of Aeralloy. Twenty three years of experience in this exacting field is built into every Wilco Aeralloy Aircraft Magneto Contact.

For analysis and recommendations on any contact or thermometal problem with which you may be faced, write—

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WILCO THERMOMETALS (Thermostatic Bi-Metals) are as outstanding in performance as WILCO CONTACT MATERIALS

Confidence in the air is born on the ground

☆ Before a spark plug fires, a propeller blade turns or a wing lifts skyward, confidence must be born—on the ground. For no longer is flying a game of chance for the recklessly brave. Chief asset in the swift progress of American aviation has been the confidence inspired by the never ceasing improvement of such vital flying necessities as Scintilla builds.

This confidence stems from the *proved* ability of each part on a plane to do its duty perfectly. We believe that it is the thoroughly satisfactory experience with Bendix-Scintilla Aircraft Magnetos and Spark Plugs that is responsible for the universal confidence in these ignition products.

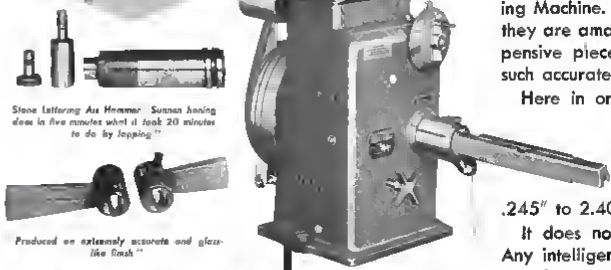
SCINTILLA MAGNETO DIVISION
BENDIX AVIATION CORPORATION • SIDNEY, NEW YORK

BENDIX SCINTILLA

☆ THE WORLD'S FINEST AIRCRAFT IGNITION ☆

SUNNEN *Precision* HONING MACHINE
Provides a New Solution to the Problem of
Accurately Finishing Internal Cylindrical Surfaces!

A Few Typical Uses



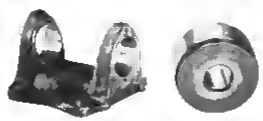
Stone Lettering Ax Hammer "Sunnen honing does in five minutes what it took 20 minutes to do by lapping."

Produced an extremely accurate and glass-like finish."

Miniature Model Airplane Cylinders "Eliminates an extensive machine set-up."

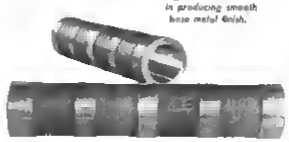
Drill Jig Bushing "Increases sales appeal of product."

Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00025 in."



Strict alignment maintained between two holes.

Drawing and Blanking Die "Saves time in producing smooth base metal finish."



A perfectly straight round hole with a mirror finish.

☆ Manufacturers—particularly those engaged in the defense program—are welcoming the Sunnen Precision Honing Machine. Many of them have said that they are amazed to find that such an inexpensive piece of equipment can produce such accurate work.

Here in one simple, practical, inexpensive machine is the answer to the problem of accurately sizing and finishing internal cylindrical surfaces from .245" to 2.400" in diameter.

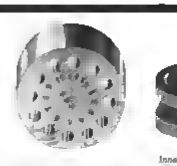
It does not require a skilled machinist! Any intelligent workman with a few hours practice can produce a super-smooth surface finish and hold accuracy to one ten-thousandth.

The Sunnen Precision Honing Machine can be set up and work located in less than one minute. Three point design of the mandrel using one cutting stone is guaranteed to correct taper and out-of-round holes.

It is ideally suited for assembly operations, production, tool room and experimental use, repair and salvage work and maintenance operation.

Hundreds of manufacturers of such parts as gauges, drill jig bushings, bearing races, automatic machinery, hydraulic cylinders, gears, valves, gyroscopes, instruments, pump parts, etc., are using this Precision Hone to their advantage.

SUNNEN PRODUCTS COMPANY
7942 Manchester Ave., St. Louis, Mo.
Chatham, Ont.



Rubber Facing Extension Die "Tripled life of extra slow dies."

Inner Bearing Ring "Accurately removes last tenth of stock."

SUNNEN

Write for FREE *Bulletin*

This new 8-page bulletin will give you complete information—or if you prefer a Sales Engineer will be glad to call with his demonstrator and demonstrate what this machine will do for you.

Now! Lightweight Harrisburg Cylinders

After years of study, the Harrisburg Steel Corporation is successfully manufacturing lightweight Seamless Cylinders of chrome molybdenum steel. Here you will find great strength, a product free from defects and at prices extremely reasonable. The same rigid inspection is given to the lightweight Cylinders as that given to all Cylinders made by Harrisburg. Chrome molybdenum Cylinders save both in weight and floor area. There is also a saving in cost equivalent to about 7%. Send for interesting booklet

* * *

Other Harrisburg Products: Alloy and carbon steels, seamless steel cylinders, pipe couplings, pump liners, liquefiers, hollow and drop forgings, pipe flanges, bull plugs and coils and bends

HARRISBURG STEEL CORPORATION

HARRISBURG ★ PENNSYLVANIA

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WE ARE READY TO SERVE YOU IN THE PRODUCTION OF

PRECISION PARTS FOR AIRCRAFT

We have the facilities, skilled workmen and equipment to meet your specification requirements.

We have the capacity and organization to handle your orders—large or small.

We are strategically located for quick and economical shipping.

We offer you the kind of precision work which can be had only from a well equipped, well organized, going concern which specializes in the kind of workmanship you need right now—for parts which must be produced by skilled mechanics on—

Broaching Machines	Milling Machines
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Electric and Arc Welders

We solicit your orders for prompt delivery, and suggest that you send blueprints and specification data for quotations at once

The SIMMONS MANUFACTURING CO.

ASHLAND OHIO

FASTER DELIVERIES for 1941

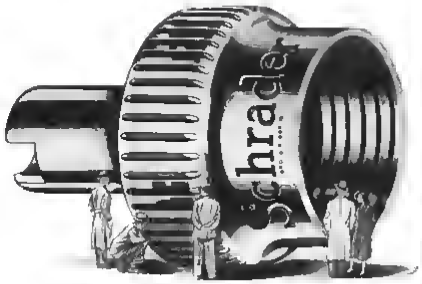
PORTERFIELD 65

Due to increased production as the result of increased demand, Porterfield Aircraft is turning out Model 65 Trainers at the rate of two ships a day. Porterfield 'Collegiate Trainers' have proven their worth many times during the past CAA training programs. They offer more real dollar-for-dollar value, safety, performance and economy than ever before incorporated in one airplane. The Model 65 is now available powered by Continental, Franklin or Lycoming. A few valuable territories are still available. Write at once for details and the new 1941 Porterfield catalog

CONTINENTAL	
Range	300 miles
High Speed	108 m p h
Cruising Speed (sea level)	98 m p h
Cruising Speed (5000 ft.)	103 m p h
Stalling Speed	36 m p h
Rate of Climb (full load)	720 ft p m
Rate of Climb (light load)	1030 ft p m
Service Ceiling	18000 ft
Span	34 ft 0 in
Wing Area	169 sq ft
Weight empty	875 lbs
Useful load	485 lbs

PORTERFIELD AIRCRAFT CORP.

1726 Wabash Ave., Kansas City, Missouri



IF A VALVE CAP WERE *BIG as a HOUSE..*

you could make a tour of inspection through this giant cap and see the many unique construction features But size could add nothing to its importance as a tire valve seal

The dirt and muck that accumulate on a wheel are extremely abrasive and destructive to wearing or seating parts A sealing cap is therefore essential to keep this dirt and grit *out* of the valve and to prevent possible loss of tire air *through* the valve

NOTE TO TIRE SERVICE MEN

Seal every tire valve with an air-tight cap This essential safety measure helps to maintain balanced tire pressures for safer take-offs and landings

Why Schrader Valve Caps Are Air tight Up to 250 lbs Pressure

1 *Valve Cap body or shell*

2 *Brass Swivel Plate allows Cap Shell to turn independently of rubber washer as Cap is applied This assures proper seating of washer and prevents distortion*

3 *Brass Dome Shaped Plate provides an indestructible chamber for tail clearance of valve core pin*

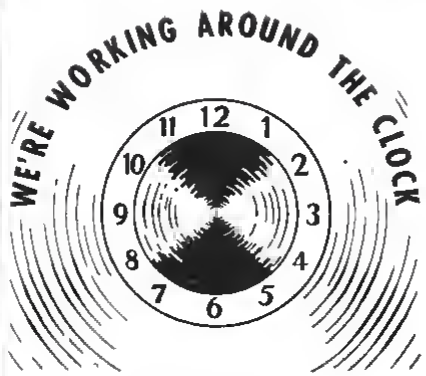
4 *Molded Rubber Washer seals valve mouth when Cap is screwed on firmly by hand, while rubber between brass plates 2 and 3 provides spring action to maintain positive seal.*

Schrader

TIRE VALVE CAPS

A. SCHRADER'S SON BROOKLYN, N. Y.

Division of Scovill Manufacturing Company Incorporated



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Alsa special hardened and ground aircraft fittings

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Curtiss P-40

Equipped with

LUNKENHEIMER TYPE C-3 STRAINER

Fig 1749

ESTABLISHED 1862

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It has been checked and rechecked for starting, radio and instruments . . . Glad to assist in any experimental work without fee or obligation—write us today.

SPECIFICATIONS

TYPE No.	Volts	Overall Dimensions L	W	H	Chg. Rate Amps.	Disch. Capacity 8 Hr A.H.	5 Min Amps	90 Min Amps.	Weight Batt. Only	Master Cover	Adj. Wire Mts	Price F.O.B. Readings Pa. Batt	Cover
333LD	6	5 1/8"	5 5/16"	7 7/8"	2	33	145	54	14 lbs	5 oz.	12	$16.75	$3.90
324LD	6	5 1/8"	5 5/16"	7 7/8"	2	24	105	39	11 3/4 lbs.	5 oz.	12	$11.90	$3.90

Contractors to United States Government Air Services and principal aircraft manufacturers.

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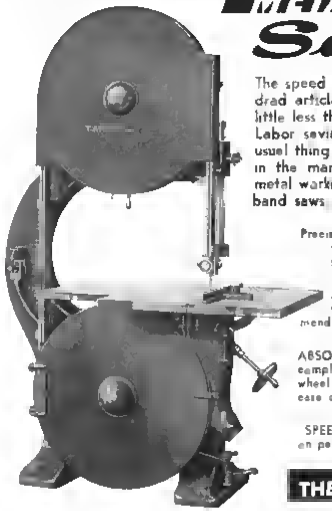
Save up to 90%!



The speed with which these machines cut sheet steel up to 1/4" thick, tubing and kindred articles with perfect safety, and the smooth character of the work they do is little less than amazing to those who witness it for the first time. (See chart below.) Labor savings ranging from 25% to 90% over other methods of cutting are the usual thing and one of the reasons these highly developed machines are widely used in the manufacture of automobiles, airplanes and products of hundreds of other metal working plants. For complete details simply write for bulletin on metal cutting band saws.

- Precision built with many patented features essential to successful high speed operation
- Saw blade travel of more than two miles per minute gives tremendous sawing capacity
- ABSOLUTELY SAFE—Both wheels are completely guarded. Synchronized two wheel hydraulic brake—automatic in case of saw breakage
- SPEED! CHANGE true running tires on perfectly balanced wheels

PRODUCTION CHART

TANNEWITZ 36" & 42" FLOAT ARBOR METAL CUTTING BAND SAWS

KIND OF MATERIAL	Thickness and feed per second in inches: 1/32	1/16	1/8	1/4	1/2	1	2	3
Mild Steel	12-24	6	3	1				
Stainless Steel	6	2	1					
Yellow Brass, Zinc	24	12	6	3	1½	¾	⅜	⅜
Bronze or Copper	6	3	1½	¾	⅜	⅜		
Aluminum	24	18	9	4½	2	1½	1	¾
Duraluminum	24	12	6	3	1½	1	½	½
Single Plymetal				6	4			
Double Plymetal				4	3			
Plywood	24-36	24	20	16	12	6	3	1½
Asbestos Board	12	6	3	1½	¾			
Fibre (Hard)	24	12	6	½				
Paper Board	24	18	12	4	2	½		
Masonite	24	18	12	6	3	1½	¾	⅜
Bakelite	12	6	3	1½	¾	⅜	3/16	

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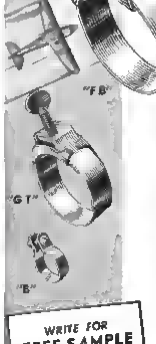
WITTEK

STAINLESS STEEL HOSE CLAMPS FOR AIRCRAFT



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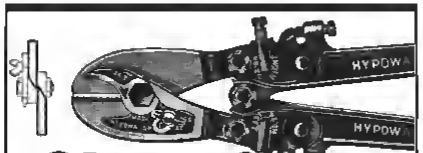

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Cable 5/8" Bore 1 1/2" x 9/32"

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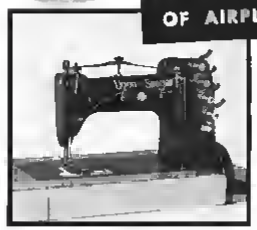

STYLE 51400 PZ • Maker approved 2 needle seam Type 401-LSe2 • Available with ¼" (standard) or ⅜" space between needles • Fitted with special tumbler type presser foot to assure perfectly flat seams • Takes thread directly from cone or spool no stopping for bobbins • Can be supplied with auxiliary roller

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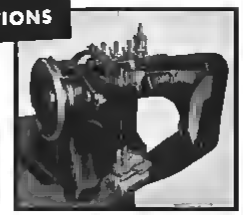

STYLE 35700 JZ • Work feeds off of cylinder type arm so that tubular sections can be closed rapidly without stopping to remove finished work from arm • Seam Type 401-LSe 2 • No bobbins to wind • Special tumbler type presser foot • High speed operation

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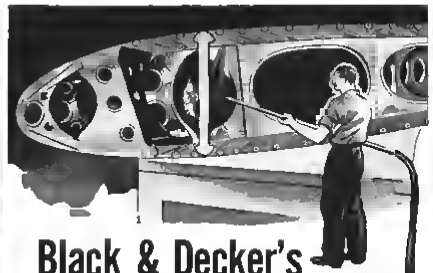

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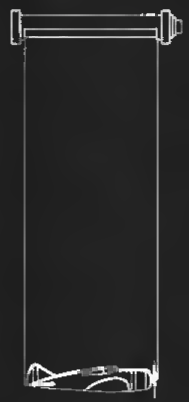

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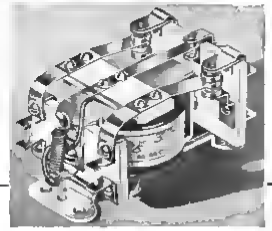

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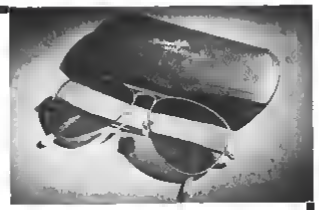

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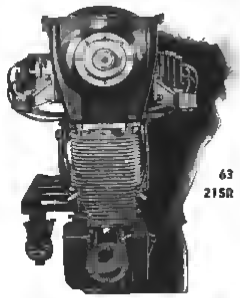

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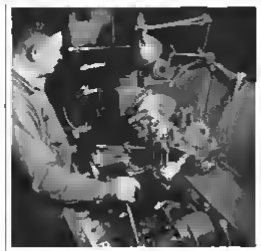

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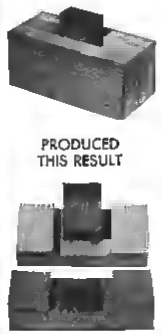

SHEAR TEST—Three identical specimens of four different combinations of wood were tested to form illustrated in the upper left photo. (Spruce glued to Mahogany, Spruce to Spruce, Mahogany to Mahogany and Pine to Mahogany). In each case the wood was glued so that their grains were parallel to the lines of force. Hydrostatic pressures operated through two inches of glue line to each specimen.

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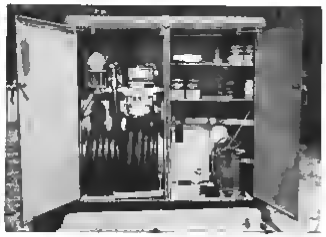

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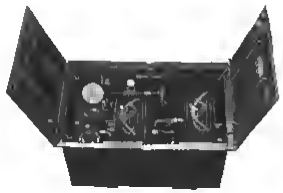

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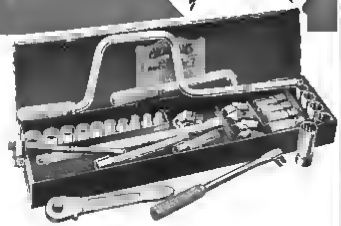

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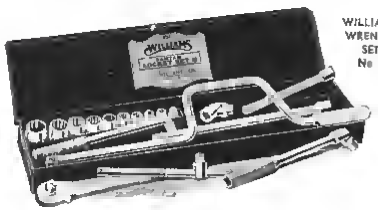

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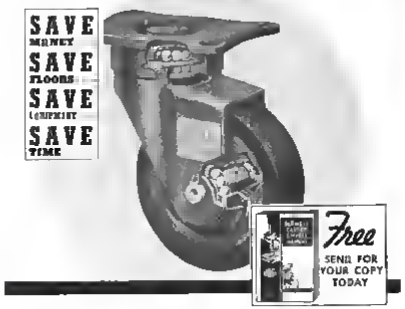

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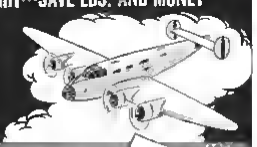

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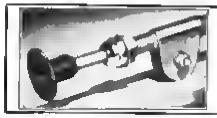

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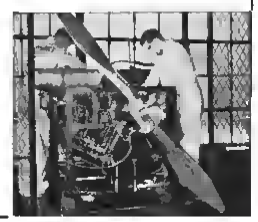

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(See index on this page)
(See also Group Classifications)

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Used Planes

TRADE: *(See ads keyed T)*

EMPLOYMENT: *(See Classification)*

BUSINESS OPPORTUNITY *(See page 281)*

Engines & Ports

See also ads marked (P) in group Classifications

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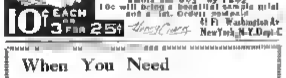

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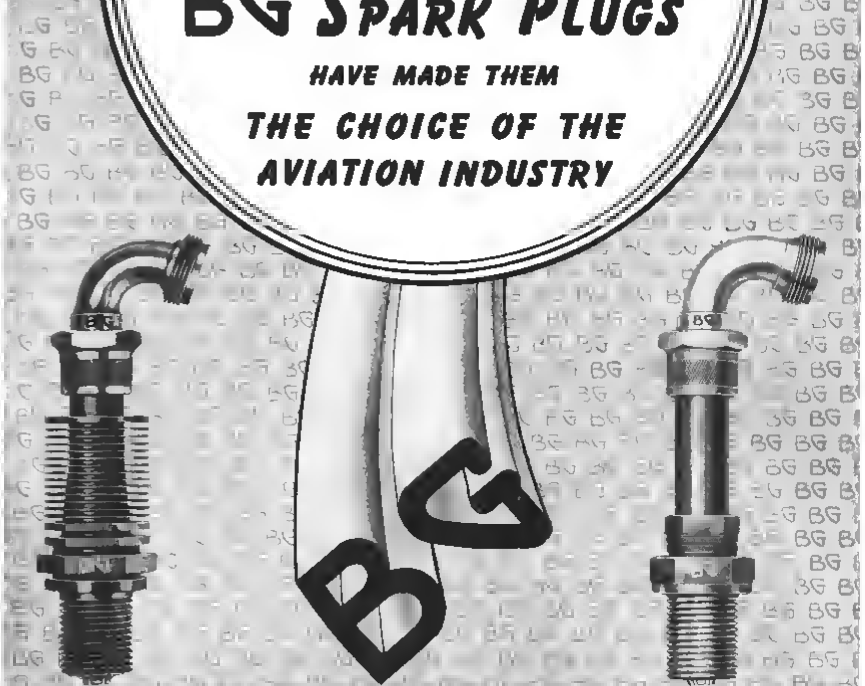

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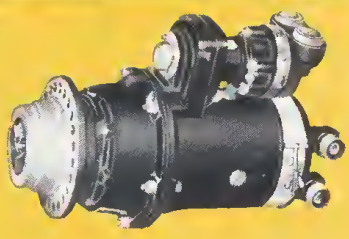

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